THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVII. No. 1709.] LONDON, FEBRUARY 11, 1896. [48TH YEAR. PRICE 6d.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

Lanemark Coal Co., LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on Application to
LANEMARK COLLIERY,
NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

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Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.
WORKS:
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LOG MOUNTAIN COAL, COKE, AND TIMBER CO.
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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

THE MELDRUM FURNACE FOR DUST-FUEL.
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FITTED
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SPECIALLY USEFUL FOR GAS-WORKS.
MELDRUM BROS.,
ATLANTIC WORKS, MANCHESTER;
16, UNION COURT, LONDON;
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58, COLLINGWOOD STREET, NEWCASTLE-ON-TYNE.

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WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765),

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MAKERS OF FISH AND SMITH'S PATENT (NO. 5108) OVERFLOWS FOR REGULATING THE SEAL IN GAS-WASHERS, &c.

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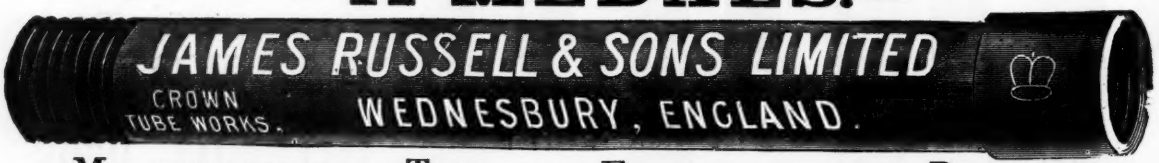

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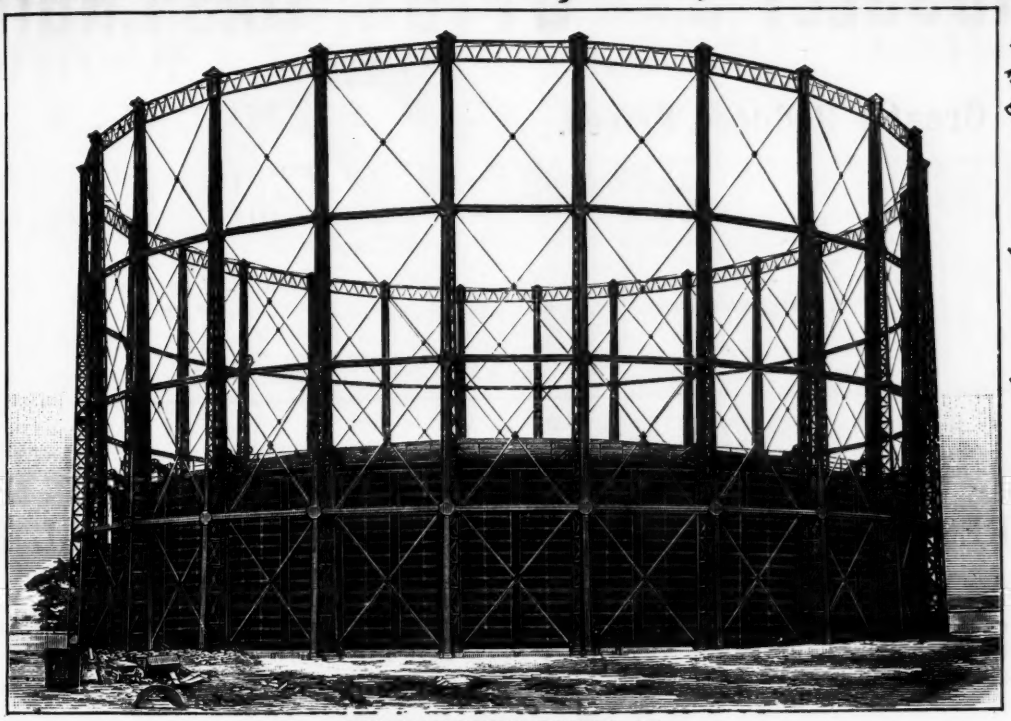

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— HAS ALREADY BEEN SUPPLIED TO GAS-WORKS AT —

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Inquiries to be sent to the Patentees: 9, VICTORIA STREET, LONDON, S.W.

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CAST-IRON RETORTS,

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Iron Roofs, Columns, Girders, Floor Plates,

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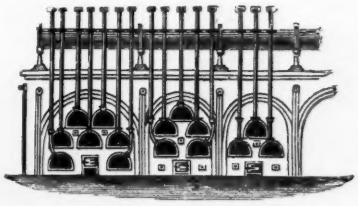

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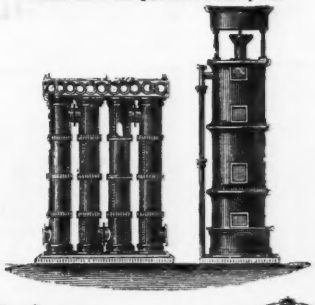

PATENT

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for working Purifiers,

Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS, and SPECIALS.

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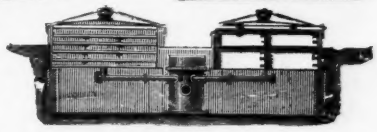

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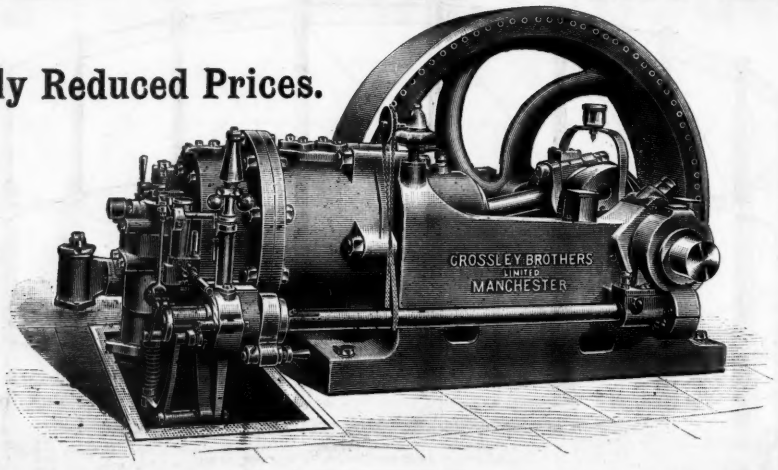
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINES

Greatly Reduced Prices.



REPRESENTS NEW TYPE 40-HORSE POWER NOMINAL HIGH-SPEED ELECTRIC-LIGHT ENGINE.

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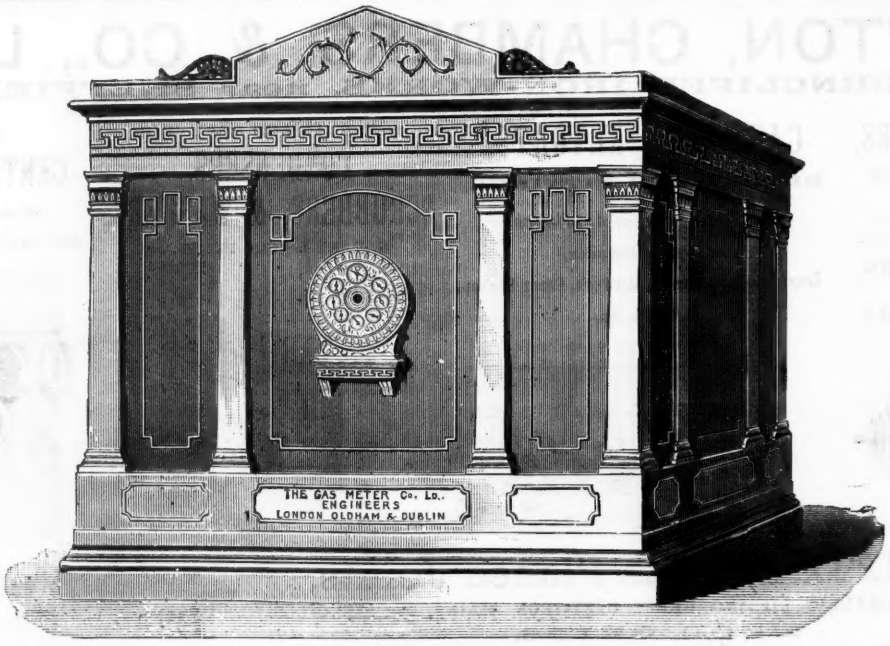

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, Late WEST & GREGSON. Established 1830.

For Prices and Particulars apply to

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Works: 238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

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[See Advertisement on back of Wrapper.

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(Welsbach Patents).

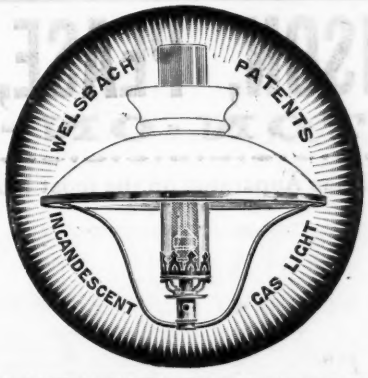
The Great Reduction in Prices,

Due to Colossal Sales,

Places this highly popular Light within the means of all classes.

The greatly Reduced Consumption of Gas

COVERS THE INITIAL COST OF THE BURNERS IN FROM SIX TO EIGHT MONTHS.



The PRICES have been REDUCED as follows:—

The Ordinary "C" Burner to 9s.

The "C" Bye-Pass Burner to 11s.

Prices of other Patterns reduced proportionately.

SPECIAL ATTENTION IS CALLED TO

THE "S" BYE-PASS BURNER,

Which, with a Consumption of 2¼ Cubic Feet of Gas an hour, gives a light of 25 to 30 Candle Power.

This Pattern is particularly recommended where it is desired to effect a large saving in Gas rather than to effect a great increase in the Light.

The attention of Gas Managers and Gas Engineers is called to this System of Lighting as one which tends to Popularize the use of Gas as an Illuminant, owing to the following Advantages—

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GREATLY REDUCED HEAT.

The *Lancet* Special Analytical and Sanitary Commission, in an exhaustive report, pronounces the Incandescent Gas-Light System to be the Healthiest, Best, and most Economical System of Gas Lighting.

SUITABLE FOR EVERY PURPOSE OF INSIDE OR OUTSIDE LIGHTING.

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WROUGHT-IRON TUBES & FITTINGS.

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PRICE LISTS ON APPLICATION.

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Makers of EVERY Description of Gas Apparatus on the most Modern and Approved Principles.

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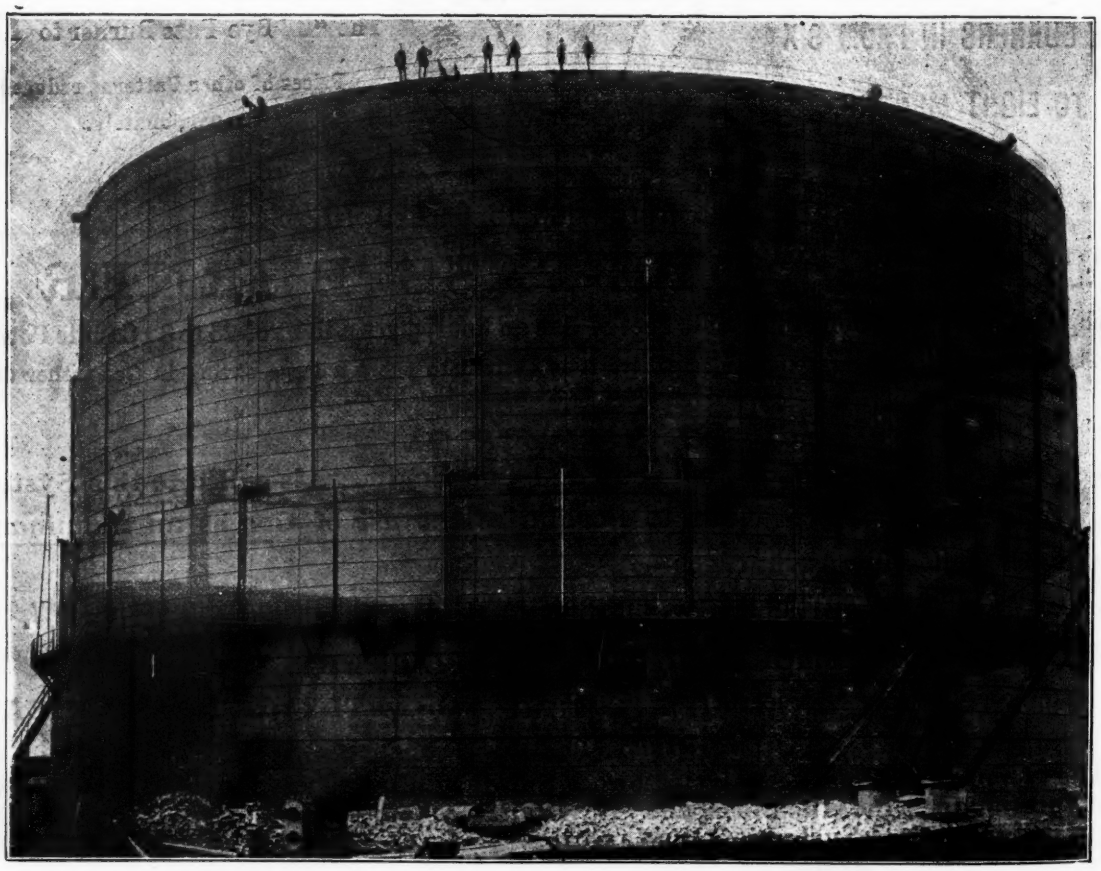

WIRE ROPES.

From Photograph of Middlesbrough Gasholder. Three Lifts, 30 ft. deep each; Tank, 186 ft. 6 in. diameter, by 31 ft. deep. Capacity 2,250,000 Cubic Feet.

By far the largest Columnless Holder in existence.

Engineers and others visiting any of the following places should not fail to examine these most interesting examples of Engineering, illustrating modern practice in Gasholder Construction. Particulars may be obtained on application to the SOLE MAKERS and Inventors, ASHMORE, BENSON, PEASE, & Co., Limited.

Nottingham (Eastcroft Works, 4 Holders).
Manchester (Rochdale Road, 1 Holder).
do. (Gaythorn Works, 3 Holders).
Darlington.
Middlesbrough (see Illustration).
Selby.
Sligo.
Milan (Italy).
Horsens (Denmark).
Bathurst (N.S.W.)
Haslingden.
Birkenhead.
Barrow-in-Furness.
Tyne Docks.
Newburn-on-Tyne.
St. Austell.
Athens (Greece).
Cape Town (South Africa).

References to American and other Users.

LATEST

Improvements in Sulphate of Ammonia Apparatus

(COLSON'S PATENT)

SEVERAL PLANTS ARE ERECTED, AND GIVING MOST SATISFACTORY RESULTS.

This Apparatus has been designed by Mr. Colson, of Leicester, with the combined objects of utilizing to the fullest extent the Steam employed in Distilling, and avoiding the necessity for frequent Cleaning, and, when this has become necessary, of Minimizing the Cost of Taking Down and Re-erecting.

The amount of Fuel consumed, as compared with that used in the hitherto most approved apparatus shows a reduction of over 25 per cent.

The Cost of Taking Down, Cleaning, and Re-erection has been reduced by more than 75 per cent.

EXTRACT FROM ENGINEER'S REPORT—

"I can now obtain 60 Tons of Sulphate of Ammonia per week with 'Colson's' Still, using ONE Boiler, whereas, with my former continuous plant, TWO Boilers were required to produce 40 Tons per week."

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THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

650,000,000

CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past FOUR YEARS.

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital, Labour, Fuel, Wear and Tear, &c.

The Enrichment is INSTANTANEOUS and PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

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THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

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GAS-BURNERS

BRAY'S
"SPECIAL" & "ADJUSTABLE" BURNERS

Are the Best for General Use, and will, at their

REDUCED PRICE,

Save their Cost in Gas alone in Forty Hours' use.

The "Adjustables" are specially adapted for use with Penny-in-the-Slot Meters, for which purpose large quantities have been sold.

THE "CODAC" ECONOMISER.

Ordinary Regulator Burner with "Codac" Top on.

A cheap adaptation of Bray's "ADJUSTABLE" BURNER, not so efficient, but acceptable for some purposes. The top part only is required, and is made merely to slip on to our ordinary Regulator Burners, which are in use throughout the world. Made in Union Jets and Batswings.

Ordinary Regulator Burner with "Codac" Top on.

SEND FOR PRICE LIST AND CATALOGUE.

GEO. BRAY & Co., Gas-Lighting Engineers, LEEDS.

MASON'S GAS-PRODUCER

[PATENT 7467-93.]

This System is the "**only**" one which works **CONTINUOUSLY**. There are no Clinkers formed, consequently a constant and regular volume of gas is maintained. Labour is **considerably reduced**, one man being able to attend to **8 PRODUCERS**. Clinkering being dispensed with, there is a saving in Fuel of quite **10 PER CENT**. A bright clear gas is obtained from **COKE BREEZE**, which can be used for heating **RETORT-BENCHES**, and every description of **FURNACE** and **KILN**.

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The PRESIDENT OF THE INSTITUTION OF GAS ENGINEERS, in his Address, stated—

"To overcome back-pressure, Mr. F. S. Cripps has designed a special form of Valve fixed in conjunction with each layer in Purifiers, and operated from outside the vessel. By this means, any tier can be by-passed as it is fouled, and free access given to the superposed one."

This Valve enables Purifiers to last much longer, without the cost of changing, by permitting the Gas to pass by the Lower Tiers when exhausted, and entering the Upper Tiers only; thus doing away with the heavy Back-Pressure of the Lower Tiers, and fully using up the unexhausted Material in the Upper Tiers.

Will save their Cost in Six Months. **Can be fixed to Purifiers in use, as well as New Purifiers.**

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Aylsham	Coventry
Ballymena	Cranbrook
Beaumaris	Cullen
Bentham	Deddington
Bewdley	Dewsbury
Bideford	Downpatrick
Birmingham	Dursley
Blackburn	East Ardsley
Bognor	Eastbourne
Bollington	Elland
Boreham	Ellesmere
Bramham	Elstree
Brandon	Eye
Bridgnorth	Farnham
Broadgreen	Felixstowe
Broadstairs	Garston
Bromsgrove	Gillingham
Broughty Ferry	Gorey
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CROSBIE'S PAINTS.

Guaranteed genuine and free from adulteration, and specially made to withstand Gaseous Fumes.

Catalogue and Testimonials on Application.

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Kegworth	Seisdon
Kilrush	Shifnal
Kildwick	Shipston-on-Stour
Kirkburton	Sidmouth
Knutsford	Skibbereen
Leamington	Slough
Ledbury	Southam
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London	Strood
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Lymington	Swinton
Merthyr Tydfil	Sudbury
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CUTLER'S PATENT FREEZING PREVENTER

WHICH HAS BEEN FITTED TO MANY OF THE LARGEST GASHOLDERS IN LONDON AND THE PROVINCES, AND IN AUSTRIA, GERMANY, DENMARK, AND THE UNITED STATES.

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FOR THE PRODUCTION OF ACETYLENE GAS

IN RETAIL OR WHOLESALE QUANTITIES.

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WITH PATENT SHADE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

Extract from the JOURNAL OF GAS LIGHTING, Jan. 8, 1895.

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it quite **supersedes** the familiar three-light pendant. We are able to bear witness to the **convenience** of the New Pendant."

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WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

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MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES

AND

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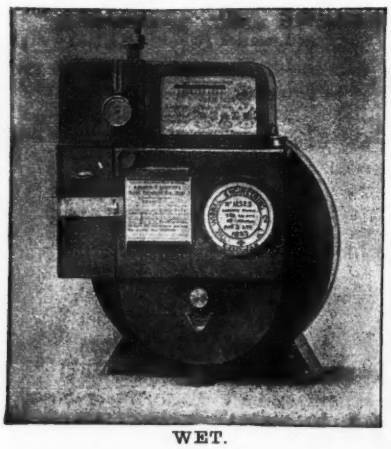
Patent New Prepayment Meters.



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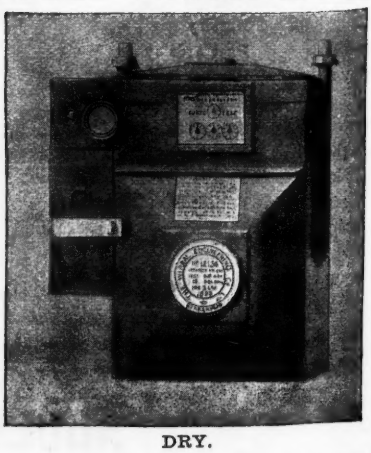
THE "PERFECT" AUTOMATIC.

Simple! Positive!! Accurate!!!

The only Prepayment Meter with no Springs, Counter-Balance Weights, or Frictional Gearing to get out of order.



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Particulars on Application to the **COMPANY, 76, Hamilton Street, BIRKENHEAD.**

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PATENT "STANDARD" WASHER-SCRUBBER

504 of these Machines (capable of dealing with 491,150,000 cubic feet of gas per day) in use and in course of construction, which fact is given as evidence of this apparatus being the most efficient of any in the Market for the Extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.

MARSHALL'S PATENT BATTERY CONDENSER & SCRUBBER.

This Apparatus being made in Sections, the Capacity can be easily and cheaply increased as required. Other advantages are: Large and Effective Cooling Area on small Ground Space; Slow Speed; no Repairs required; High Strength Liquor obtained; and Easy Control.

Six of these Condensers in course of Construction and Erection.

CENTRIFUGAL TAR-SEPARATORS.

(*Vide* JOURNAL OF GAS LIGHTING, *May* 22, 1894.)

These Separators completely separate the Tar and Liquor, making the Tar saleable at higher prices, and saving the Liquor otherwise wasted.

MARSHALL'S PATENT TAR-EXTRACTOR.

Extracts practically all the Tar, and, experience proves, keeps clean and free from choking up. In use at Ilford, Antwerp, Copenhagen, &c., &c.

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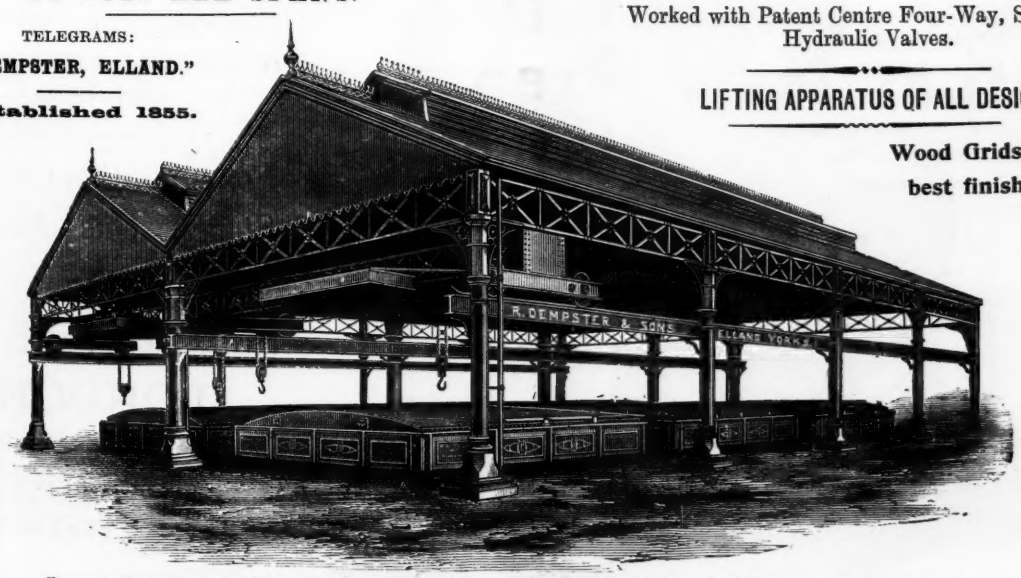

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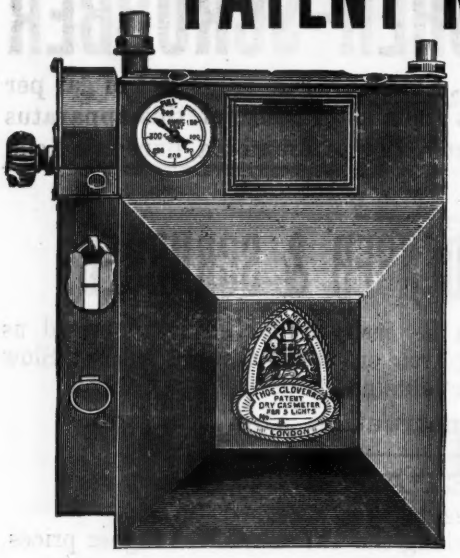

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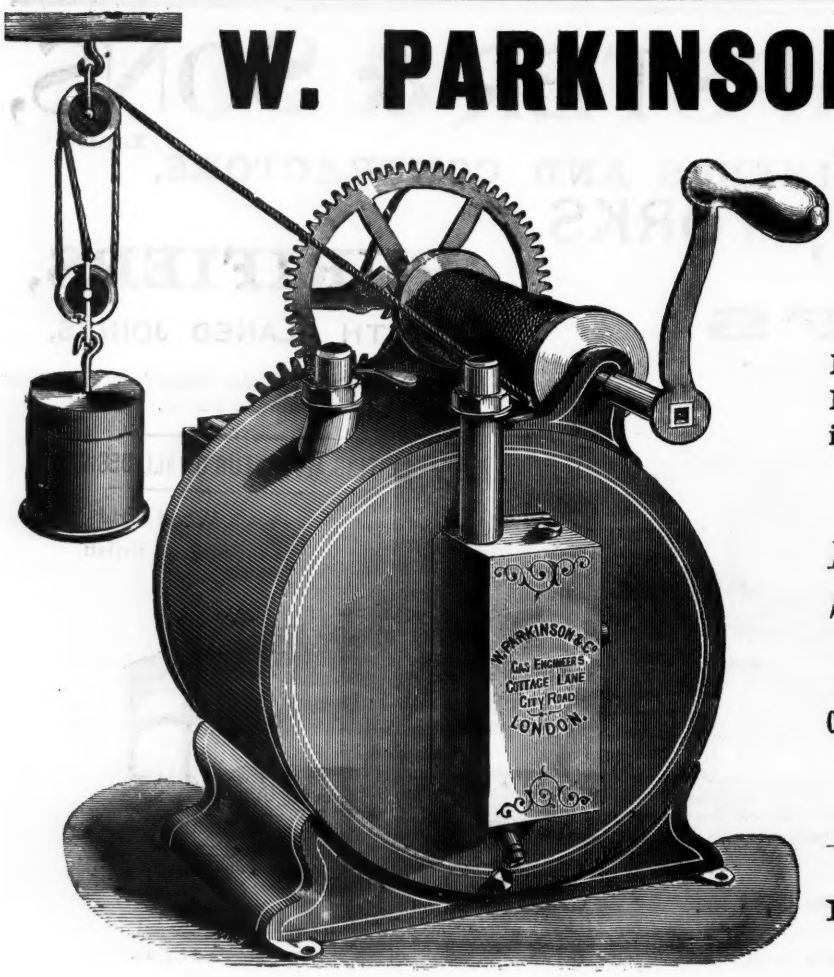

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EDITORIAL NOTES.

The Chartered Meeting.

THE meeting of The Gaslight and Coke Company last Friday was one of a series to which the proprietors have grown accustomed, and as to which probably their familiarity has had its proverbial effect. The Governor (Colonel Makins) was optimistic, plausible, and adroit in the performance of the act of "managing" the meeting; Mr. George Livesey spoke of incapable business management, and foreboded trouble to come from the high price of the Company's gas; and then the Governor neatly wiped up everything to his own satisfaction, and the opportunity for commending or criticizing the conduct of the undertaking was terminated, not to return for six months. Colonel Makins does not like criticism in any shape, or from any quarter. If it is offered by the Press, he refers to it with lofty scorn as "irresponsible;" or, as on Friday, he valiantly declares his complete indifference to it. If it comes from an individual proprietor whose competence in technical matters cannot be gainsaid, he does his best to ascribe it to the critic's splenetic temperament. We are not concerned either to applaud or to chide Mr. Livesey for assuming and persisting in the thankless office of censor of the Horseferry Road authorities. He was called a "Jeremiah" for his pains, last Friday, by Mr. Rokeby Price. But, really, he belongs to the order of Cassandra, whose prophecies, though true, were fated never to be believed by those to whom they were addressed. It surely cannot be a pleasant course for Mr. Livesey to stand up in performance of what he considers his duty, only to become the butt for the light sarcasms of the official apologist for the Court, and to realize that his hearers on the same side of the table care for none of the things he is able to tell them about. One might wonder at his perseverance in this behaviour, but for the knowledge that he (like the "JOURNAL") appeals to a larger and more powerful tribunal that the autocrats of the Horseferry Road and their incurious little public of dividend-takers. The day will come when the sayers of smooth things in the ears of the Chartered proprietors of the present will not be thanked for their light-heartedness, which is too much like that of the French Minister before the prospect of the Prussian war to be perfectly reassuring. Mr. Livesey will, of course, do as he likes, or, rather, as he thinks right; but so far as the "JOURNAL" is concerned, nothing that can possibly emanate from the Horseferry Road in the shape of cheaply-affected scorn will avail to stay criticism of the shortcomings of the so-styled "Department of State" there established.

Friday's debate revolved mainly round the subject of Horseferry Road dealings with coke—more especially in connection with the case of the cement manufacturers. The Governor was fain to confess that this important section of buyers of coke have left Beckton severely alone, with the result that a huge stock of coke has accumulated, and will have to be sent abroad—if it could be sent out of the world, so much the better. The careful student of what the Governor, Mr. Livesey, and Mr. White said on this subject will not have much difficulty in forming the opinion that, in this matter, the Horseferry Road was too grasping, and, as usual, overreached itself. With a brave show of mastery of the principles of commerce, the Governor claimed that when the coke trouble began in 1894, with the appearance of a mysterious cement maker with an offer to buy any quantity of coke at a price markedly above the normal, the correct thing to do was to "open the mouth and shut the eyes and take" what the negotiator offered. In the same breath he also declared that the Company were right last year in refusing the offer of the associated cement manufacturers, because to do so would have been to play into the hands of a "ring"—which, of course, was a thing the Company never could, would, or should do on any account.

Now here the "irresponsible critic" has a very obvious comment to make. How was the Horseferry Road to know that the associated cement manufacturers had formed a "ring" with the object of forcing down the price of coke, except by looking beyond the mere fact of the offer by them of a certain contract price? And why did not the same men of business exercise the same perspicacity in treating with the man of large offers the previous year? They never seem to have suspected that, in snapping at this offer, they might be binding themselves hand and foot

under the most deadly kind of "ring"—the ring which is constituted by one man. Colonel Makins's business notions are indeed conceived in a spirit that goes little farther than holding out for a little more than is offered, when selling, and offering a little less than is asked, when buying. And the whole business is done with such an assumption of authority, as Mr. White complained, as the richest cement manufacturer of them all could not sustain in dealing with commercial firms and persons.

Colonel Makins is reported to have put forward the astonishing pretension that the Horseferry Road is a sort of "Government Department," and as such is absolved from the obligation to do its business in a businesslike manner. Well, since he has chosen his model, we will humour him by "making believe" that he and his agents occupy a place in the scheme of things similar to that filled by the Admiralty. He cannot take offence at this comparison. Will he now oblige by referring to a leading article in the "Engineer" for the 17th ult., for an irresponsible critic's view of the business capacity of this particular department, and see how it fits his own case? The parallel is too instructive to be overlooked. It may not yet be customary to wear cocked hats at the Horseferry Road; but there is apparently as much "red tape" there as at Whitehall.

The Manchester Gas Committee and the Residuals Trade.

THE proceedings at the Local Government Board inquiry into the proposal of the Manchester Corporation to convert their own ammoniacal liquor into sulphate, instead of selling it as heretofore, are not devoid of general interest. The case for the proposal was presented by Mr. G. E. Stevenson—whom we have pleasure in congratulating upon his formal advancement to the position of Consulting Engineer to the Corporation Gas Committee—who made out that, when liquor is valued at a price corresponding to sulphate at £9 per ton, the Committee might expect to effect the manufacture of the salt at a total cost of £7 19s. 6d. That is to say, the cost of manufacture, without the liquor, should be 1d. under £3 per ton of salt. There is thus not a great deal of money in the business at the present value of sulphate. Exactly how much a gas undertaking saves by working up its own liquor is not by any means easy to ascertain on general principles. The element of carriage is almost paramount in any consideration of a case in point, but not to the exclusion of others. Manchester stands in the position of not possessing statutory powers to manufacture sulphate; and the recent inquiry was directed to ascertain whether it is expedient that such powers should now be given to the Gas Committee.

As bearing upon this question, it is curious to observe that strenuous opposition to the proposal of the Committee was offered by a crowd of chemical manufacturers, from which circumstance Mr. T. Newbigging, speaking on behalf of the Corporation, drew the reasonable inference that it must still be worth while to make sulphate. It should be remembered that last year the Manchester Gas Committee only received a single tender for their liquor; so that the congregation of the chemical trade to oppose the desire of the Committee to be authorized to go into the manufacture of sulphate on their own account, ought not to be explained upon selfish grounds. They were, of course, afraid lest the atmosphere of Ancoats and Holt Town would be contaminated by evil odours proceeding from the proposed chemical works! The mainstay of the opposition was Colonel Sadler, of Middlesbrough—what was he doing in that galley?—who made out a woful case for the sulphate trade. At least, his evidence could not fail to be interesting, if it was not at all points convincing. Mr. Holden, the present contractor for the liquor, expressed to the Inspector his doubts whether the Corporation could deal effectively either with the manufacture or the sale of sulphate; thus reinforcing our own remarks when it was first announced that the Gas Committee wished to make sulphate in order to circumvent the local dealers in liquor. Colonel Sadler declared roundly his conviction that no corporation or gas company can do so well in the working up and sale of residuals as a private and personal trader. We agree with him here, and think the exceptions that might be advanced on the other side of the argument only prove the rule. Apart altogether from any comparison of the commercial efficiency of gas companies and corporation committees, it is certain that the qualities which go to make excellent officials of a statutory gas undertaking are opposed to those which render a trader successful in the market-place. If a representative gas official is pitted—as is often the case—against a chemical trader on the latter's own ground, the case is like that of a good boy carefully brought up in a big orphanage matched against a street arab. Yet even the chemical manufacturer gets bested sometimes, as Colonel Sadler confessed. It is for these reasons that we have observed, and now repeat, that the manufacture of sulphate, to say nothing of tar products, on their own account, by the Manchester Gas Committee, will by no means deliver them from that fear of "rings" which has impelled the Corporation to contemplate taking this new departure.

The Lessons of the Tynemouth Disaster.

A REPORT of the proceedings at the adjourned inquest on the victims of the Tynemouth disaster will be found in another column. The evidence leaves no room for uncertainty as to the cause of the fatality, which, as already reported, occurred in the chemical works, and had no connection with the gas-works proper. It was really due to an unsuspected imperfection of the arrangements imposed under the Alkali, &c., Works Regulation Act for dealing with the sulphuretted hydrogen fumes emanating from the sulphate of ammonia plant. Oxide of iron purifiers were, as usual, provided for absorbing these waste gases; and the boxes were in duplicate—the current of gas being controlled by screw-down slide-valves. Somebody failed to close the valve on the gas-main leading into the purifier which was to be changed; and consequently enough of the poisonous gas passed into the box to do the mischief recorded. There was nothing wrong with the valve itself; and during the eleven years that the plant has been in operation, nothing has happened to indicate the existence of any danger in relation to its working. Yet now the wisdom that comes after the event points to several elements of hazard in the arrangements. In naming these, we must not be in any way misunderstood as imputing want of foresight or prudence to anybody concerned with the designing or supervision of this particular plant. The disaster which has served to throw light in so terrible a fashion upon the existence of these risks, was a pure accident, which is not deprived of this quality by the probability that, if certain conditions had been different, it could not have happened. Most accidents belong to the category of events that need not have occurred if all had been known. Human prescience is limited, however; and human actions cannot be relied upon to be always correctly performed. Most of us have had bitter experience of that reflective mood in which, after the event, the devastating thought arises of how it might have been otherwise *if*——

With regard to gas-purifying plant in general, good use can be made of this Tynemouth lesson, which teaches several things, some of them being perhaps "counsels of "perfection" for works managers deprived by circumstances of the power to follow them. In the first place, as our correspondent Mr. Maurice Schwab points out, it is easy to make such a disposition of purifier-valves as shall render the working of the boxes practically safe. The plan of putting gas-valves in a pit is a relic of the old principle in gas-works design, which should be regarded as obsolete, by which all connections were buried out of sight, and as much out of reach as possible. The first innovation upon this practice was when gas-mains were exposed in trenches covered with gratings. But several cases of explosions due to escaped gas lying in these channels, and travelling to distances where a light lay in wait for it, led to the far superior plan of keeping the pipes and valves above ground whenever possible. Then, again, the expedients of purifier-pits, or purifier-houses, are fundamentally objectionable. Of equal importance with the prevention of unauthorized and irregular admission of gas into such a vessel as a purifier, is the desirability of providing ample ventilation, whereby its accumulation may be obviated if it should get into the box when not wanted. In too many gas-works supposed to be of good modern design, the error of covering up and housing in everything is still conspicuous. Very many gas-purifiers are enclosed in buildings which, for gloom and absence of free circulation of air, might have been copied from mediæval cathedrals. If the Tynemouth disaster serves to draw attention to the danger of these survivals from an unscientific past, it will not have been without at least one redeeming point.

A Revolted Trade Unionist.

An interesting letter, purporting to be written by a member of the Amalgamated Society of Engineers, and bearing in its style of composition evidence of some such origin, was printed in last Wednesday's "Times." It dealt with the affairs of the Society from the point of view of a non-official member; and it was the first communication from such a quarter taking note of the criticisms of "The "Times" "Special Correspondent lately in Glasgow," which threw light upon the financial condition of this Trade Union in connection with the recent strikes. The writer begins by observing, reasonably enough, that he has been all this time waiting for and expecting somebody representing the Society to reply to the aspersions that have been cast upon its financial administration; and in default, he undertakes to tell what he thinks about "the general conduct "of the Society as a Trade Union." He confesses that the members "do not associate so much for the common weal "as we would make believe we do;" but for very personal reasons, and with an eye mainly to individual benefits. "Trade interest only takes a second place." It is beginning to be doubtful, however, whether the benefits which have been subscribed for are likely to be realized; and consequently this candid member proceeds to inquire what becomes of the money of himself and the other would-be beneficiaries. The first things that arouse his ire in the published accounts are the entries for administrative expenses. One member, he finds, is paid £100 "because M.P. is tacked "to his name." Nobody knows what this payment is for. "The member I refer to," says the writer, "is supposed "to represent Labour. I have no faith in Labour leaders. "In most instances they are misleaders, who batten on "the daily wage-earner. Their knowledge of labour "(work) mainly consists in keeping as far from it as they "can, and being well paid for doing that." Then the critic is disgusted that his hardly-earned contributions should be charged with the cost of Trades Congresses, Trades Councils, and other "fetishes" of modern Trade Unionism, which the Society once did very well without. He objects to pay for these various opportunities when the "leaders" advertise themselves, and in some unexplained manner are conventionally disposed to advance the cause of Labour. It might be suggested that the newspapers and party politicians who profess so much regard for the opinions "resolved" at these congresses should be asked to bear the expenses. The correspondent of "The Times" asks that the Trade Unions which are really desired and intended by their members to be benefit societies, should be subjected to Government inspection, and be put on a level with friendly societies. "Let trade societies be no longer "at the mercy of a few individuals who pervert them to "their own personal advantage." Obviously, this particular Trade Unionist is not disposed to regard the whole duty of the Society man as consisting in furnishing a pedestal whereon his paid leaders may air themselves and bask in the rays of the light that shines from the tower of St. Stephen's.

Sulphur in the Products of Gas Combustion.—According to the "Revue Universelle des Mines," a number of experiments have shown that the proportion of sulphur in the products of the combustion of coal gas which is converted directly into sulphurous anhydride ranges from 89 to 99 per cent. The conclusion is therefore come to that those who maintain the direct formation of sulphuric acid are in error.

Southern District Association of Gas Engineers and Managers.—We are asked by Mr. J. W. Helps, the Honorary Secretary of this Association, to state that the annual meeting of the Association will be held on Thursday, the 20th inst. (a week later than the usual date), at the Holborn Restaurant, when the President, Mr. A. F. Browne, the Engineer of the Rotherhithe works of the South Metropolitan Gas Company, will deliver his Inaugural Address.

Reports of Gas Associations, 1895.—As will be seen by the announcement which appears elsewhere, the volume of reports of proceedings of the various District Associations of Gas Managers during the past year is now ready. As most of our readers are aware, the book presents in a collected form, convenient for reference, the papers and discussions at the meetings of the smaller organizations of gas engineers and managers. This is the thirteenth year of publication; and the present volume agrees in general appearance with its predecessors. The technical matter, which is illustrated by thirteen diagrams and one folding plate, occupies 385 pages; and it is accompanied as usual, by lists of the members of the several associations, and a general index.

WATER AND SANITARY AFFAIRS.

None too soon, though just before the re-assembling of Parliament, the report of Colonel Ducat, R.E., and Dr. F. W. Barry, with respect to the alleged failure of the East London Water Supply last summer, has made its appearance, dated Nov. 11, 1895. In this form, we have the result of the inquiry conducted last October by these Departmental Inspectors of the Local Government Board, deputed by the President of the Board to investigate the complaints made concerning the East London Company. That Mr. Chaplin stood in need of the information thus presented to him, is very unlikely. But it appeared that other people required enlightenment; and we may consider it was really for their benefit that the inquiry was granted. That Mr. Kyffin and his colleagues will be satisfied with the result, is too much to expect—especially if these agitators take their cue from the "Daily Chronicle," which bitterly attacked the report in its leading columns on Friday last, but omitted to give its readers the benefit of a single line from the report itself. The "Chronicle" concludes its remarks by stating: "All we have to say at "present is that this report will have to be looked into a "little more closely when Parliament meets." We are happy to agree with our contemporary on that point; and perhaps on a more minute examination of the document, the editorial critic will be able to discover that the officials who conducted the inquiry and drew up the report were not exactly "Board of Trade Inspectors." As the "Chronicle" has a profound contempt for Mr. Chaplin, this disregard of the Local Government Board is perhaps involuntary.

It is well to know where the opposition to the Local Government Board report is likely to seek its strongest justification. It appears that reliance is still placed on Mr. Binnie's theory that the deficiency in the quantity of water received by the East London consumers during July and August was due to leakage from mains "shattered" by the frost of the previous February. How this could be the case, is inconceivable. It is in evidence that all the fractured mains were repaired by the middle of April. On May 28, all the reservoirs were "full and overflowing." An increased waste over the ordinary supply, shown in a table drawn up by Mr. Binnie, as regards February, March, and April, is allowed to have been largely due to the escape of water from the fractured mains, as well as from the fractured communication-pipes. But in another table, Mr. Binnie shows that there was a diminution in May, in the excess of the supply pumped into the district, to the extent of more than 50 million gallons, when compared with the excess in each of the three previous months. This diminution in the excess agrees with the Company's statement that the mains were rendered intact by the middle of April. The Inspectors make the remark that, as all the Company's reservoirs were full on May 26, so "the fact that an excess of water was pumped into the "district prior to that date cannot be regarded as having "any bearing on the subsequent scarcity." That an excess of water, amounting to 213 million gallons, or less than five days' supply, was pumped into the district in the month of June, is to be accounted for by the continued leakage from the communication-pipes. There are other facts which also go to prove, as the Inspectors state, "that the scarcity in July and August was not accounted "for in the manner suggested by Mr. Binnie."

As to the actual cause of the deficiency in the supply, the Inspectors declare their opinion that the necessity of suspending the constant service in East London and in Leyton was "forced on the Water Company by the unprecedented drought in the Lea Valley during the first six "months of 1895, following on the unusually long and "severe frost, which had caused such extensive fractures "in lead pipes that they could not be repaired fast enough "to prevent exceptional waste of water." The Inspectors further say that they consider the East London Company were "hampered," in dealing with the difficulties which beset them, "by the want of the additional storage and "pumping power that their Bill of 1893 would have given "them had it passed into law at that time." In pursuance of the powers granted by the Act of 1894, the Company are now completing works giving an additional storage capacity in their Racecourse reservoir for 200 million gallons, together with pumping machinery capable of raising 3 million gallons per day from the chalk. Other reservoirs, in course of construction at the time the

report was prepared, will finally increase the Company's storage to 1200 million gallons, equivalent to the average supply for 27 days. The storage capacity hitherto, we may here observe, has been equal to 14·9 days. Hence the extended works will give protection against any scarcity "for many years to come." It excites a painful feeling of regret, to know that all this might as well have been done early last year; and that, in such a case, according to the evidence of Mr. Bryan, the Company's Engineer, the constant supply could have been maintained, and "the "drought would not have been felt" by the consumers. Briefly reviewing the proceedings in Parliament in connection with the Bill of 1893, the Inspectors say "the "responsibility for the want of this storage cannot justly be "saddled upon the Water Company."

It is now declared, on the authority of the Local Government Board, how the recent deficiency in the water supply of East London was caused, and how it might have been prevented. The Inspectors very properly refrain from going into the merits of the case brought by the Company against the County Council. But the facts speak for themselves, showing that all the "grave inconvenience" and "hardship" suffered by the people of East London last summer is traceable to the action of the County Council in 1893. So also, had it not been for the majority of one in the House of Commons in 1894, the Company's Bill would again have been lost, and a million of people left in peril of their water supply running short. It is no wonder that the County Council and their advocates try to argue away the responsibility thus clearly resting upon the antagonists of the Water Company. The theory of the "shattered mains" being disposed of, and the reality of the drought being thoroughly established, what remains to be said? The "Chronicle" admits that "on some of the minor counts of the indictment the Com-"pany are able to ride off on a fairly plausible defence." In plain English, the indictment broke down altogether. There remains yet a quibble; and it is this—that the communication-pipes were fractured by the frost because they were connected with mains which were not laid at a sufficient depth. The assumption is twofold—first, that the mains were too near the surface; and, secondly, that the communication-pipes "broke at the main." "If" the communication-pipes broke in this manner, then, it is contended, the Company are all in the wrong. Such is the slender basis of the present argument. A host of allegations have been each and all disproved; nevertheless, after a searching inquiry by a Government Department has disposed of every accusation, the controversy is to be renewed over a shadowy "if." But the new works which are to do battle with future frost and drought are being completed. Year after year water will flow freely into the district; and, while the East London Company have come unscathed out of the recent inquiry, so much cannot be said for the County Council, who have proved themselves to have been obstructives in a matter which demanded progress worthy of the name.

Liberty and Property Defence League.—The thirteenth annual report of this League has been issued. We learn therefrom that during the past year the League grew in strength and influence; and that the amount of subscriptions received was the largest yet contributed in any year. The number of individual members continues to increase; and 188 associations, societies, and corporate bodies, representing every important interest and industry in the United Kingdom, are now federated with the League. For these bodies, the League acts as a parliamentary agency; and during the last session of the late Parliament, the League opposed no fewer than 40 Bills injuriously affecting the interests these bodies represent. Nearly a quarter of a million publications, dealing with political, economic, and social questions, were printed and distributed by the League during the past year. A press correspondence department has been established at the offices of the League, for the purpose of sending to the Press original letters on subjects of interest; and nearly 300 of such communications have appeared in the London and provincial papers during the few months the department has been in existence. These letters are signed by Mr. R. N. M'Dougall, who has charge of the department. A sample of this gentleman's work has lately reached us in the form of an analysis of the recently issued returns relating to gas undertakings in the United Kingdom. Mr. M'Dougall has taken out all the towns where the charge for gas is less than 3s. per 1000 cubic feet, whether supplied by companies or by local authorities; and he finds, upon investigation, that there are more of the former than of the latter who are able to sell gas below the above-named figure.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 305.)

THERE was but little to note by way of change in the general characteristics of the Stock Markets last week as compared with its predecessor. Business was for the most part quiet, especially in the more speculative descriptions, in regard to which much caution was exhibited. But towards the close, the South African market picked up considerably, encouraged by Mr. Chamberlain's despatch. High-class investment stocks were in best demand; and Consols on Tuesday again broke the record with a mark of 108⅝. Americans had a chequered time; being depressed on Monday by the passage of the Silver Bill, but revived on Thursday by the counter influence of the new loan. Taken all round, prices of all descriptions closed higher. The Money Market is practically unchanged. Business in the Gas Market was pretty active, though it was largely restricted to one or two of the biggest undertakings. In Gaslights, the "A" was especially active; and after many dealings at steady figures, it began to show a disposition to rise, and finally closed with an advance of three points, with business marked 306 on Saturday. This was after publication of the report of the proceedings at the general meeting on Friday; and it indicates satisfaction with them on the part of some buyers. The debenture stocks were influenced by the great demand for choice investments; and a rise was made there also. South Metropolitans profited by the favourable report and accounts issued; and the "A" and the "C" advanced. Commercials were very quiet; but both the new stock and the debenture realized top prices. The Suburban and Provincial division were nearly stagnant, hardly a transaction being marked among them; but they were very strong. Brentford and Alliance improved their position. Business in the Continental group was rather below the average; but prices were good enough, and quotations had a slight advance in European, Union, and Imperial. Among the rest, Melbourne bonds advanced; and Buenos Ayres and Cape Town were fractionally higher. The Water Companies had a fine time—the best week they have had for a long while; and several stocks made a considerable advance. East London led the way; being favourably influenced by the issue of the inquiry into their affairs.

The daily operations were: Business in Gas opened fairly brisk on Monday, at good steady figures. Brentford old rose 2; and ditto new, 3. In Water, Chelsea, East London, West Middlesex, and Lambeth tens advanced 3 each; and Kent, 2. Transactions were a good deal quieter on Tuesday; but prices were still on the rise. South Metropolitan "A" rose 4; ditto "C," 2; and European, ½. Southwark Water went up 1. Wednesday brought some return of activity; but the only change was a rise of 1 in Melbourne 4½ per cent. bonds. In Water, New River improved 3; West Middlesex, 2; and Kent, 1. Business fell off on Thursday; but stocks were full of rise. Gaslight 6 per cent. debentures advanced 4; Melbourne 5 per cents, 1; Alliance and Dublin, ½; and Buenos Ayres, ¼; Water again rose freely. Chelsea, New River, and West Middlesex gained 3 each; and East London and Lambeth, 2 each. Friday was more active, and Gaslight "A" rose 2. The advances in Water were 6 in East London; 3 in Kent new; and 2 each in Kent, Lambeth, and Southwark 7½ per cents. Saturday was unusually brisk. Gaslight "A" improved 1; and Continental Union, 2. New River advanced 2.

ELECTRIC LIGHTING MEMORANDA.

The Issue of the Revised Board of Trade Regulations—The New Regulation as to Street-Boxes—Obligation to Give Notice of Gas Leakage—Capital Expenditure on Electric Light Undertakings.

THE revised regulations for electric lighting systems under the Electric Lighting Acts, 1882 and 1888, have been issued by the Board of Trade. It is explained that two objects are aimed at in these regulations—first, to secure the safety of the public; and, secondly, to ensure a proper and sufficient supply of electrical energy. In other words, they are to impose all reasonable precautions against accident in connection with the supply of electricity for the purpose of lighting, while not imposing upon undertakers restrictions which shall place any unnecessary obligation upon the electric lighting industry. It had become for some time evident that the original regulations devised by the Board of Trade were out of date; and last year the Department resolved to take steps for bringing the rules more into harmony with modern requirements. In order that this might be done to the best possible advantage of all concerned, Sir Courtenay Boyle, the Permanent Secretary, with the full approval of the President of the Board, convened the conference on the subject which took place in November last, and was duly mentioned in this column at the time. We have recorded how the conference disposed of most of the questions in regard to which differences of opinion existed between representatives of the electric lighting and of the other interests affected by the regulations; and how the only important point reserved—the proper definition of "pressure"—was referred to a Committee of experts, who soon found a solution of the problem. Their recommendation, raising the maximum pressure

of low-pressure supplies from 300 volts continuous, or the equivalent of 150 volts alternating, to 500 volts continuous or 250 volts alternating, is accepted, and forms part of the regulations.

The amended drafting of the rule applying to street-boxes was left to the Board of Trade; and it now reads as follows:—

In addition to the provisions contained in regulation 27 as to the construction of receptacles for electric lines, the following regulations shall be observed with respect to the construction of street-boxes: (*a*) The covers of all street-boxes shall be so secured that they cannot be opened except by means of a special appliance. (*b*) The covers of all street-boxes containing high-pressure apparatus other than cables shall be connected to strips of metal laid immediately underneath the adjacent roadway, and efficient means shall be taken to render it impossible that the covers or other exposed parts of these boxes, or any adjacent material forming the surface of the street, shall become electrically charged, whether by reason of leakage, defect, or otherwise. (*c*) Where street-boxes are used as transformer chambers, reasonable means shall be taken to prevent as far as possible any influx of water, either from the adjacent soil or by means of pipes; and in the case of any such street-box exceeding one cubic yard in capacity, ample provision shall be made, by ventilation or otherwise, for the immediate escape of any gas which may by accident have obtained access to the box, and for the prevention of danger from sparking. (*d*) All street-boxes shall be regularly inspected for the presence of gas; and if any influx or accumulation is discovered, the undertakers shall give immediate notice to the authority or company whose gas-mains are laid in the neighbourhood of the street-box.

The maximum penalty on conviction for default in complying with any of the regulations is £5, with a continuing daily penalty of a like amount.

There is nothing for proprietors of gas-mains to complain of in this regulation, which reinforces the obligation upon the owners of electrical conduits, as the latest comers, to give notice to the gas company of the presence of gas in their subterranean cavities. Notwithstanding the recorded opinion of the Lord Chief Justice on the subject, gas companies cannot possibly know all about the state of their distributing plant at any moment; and they will welcome information from every source respecting the occurrence of leakage.

In a supplement to the "Electrician" for the 31st ult., there appears a statement of capital expenditure *in* electric supply undertakings, as our contemporary prefers to express it, to the close of the past year. Much trouble has apparently been taken in the collection of the figures; and the reluctance of many "parties concerned" to disclose how much they have spent, or propose to spend, upon their ventures must have made the task a tedious and thankless one. Many—indeed the greater number—of the returns were contributed or checked by the undertakers, and are therefore authoritative. But in numerous instances the figures have been arrived at from the best available sources; while as to others even this resource has failed the compilers. Subject to all faults and omissions, however, it is shown by the statement that the amount expended *in* electric supply undertakings throughout the country is: By companies, £5,618,336; by local authorities, £2,383,507. Upon reviewing the circumstances, our contemporary regards it as safe to estimate that a total sum of "about £10,000,000 is invested in electric current supply undertakings in this country." This is rather a sweeping generalization. But, after all, it does not greatly matter for the purpose of presenting a dazzling bird's-eye view of the subject, whether or not the gross capital obligation is a million pounds too high. Very naturally, the "Electrician" expresses great satisfaction at the prospect thus spread out for contemplation. It might be possible to point out a good many questionable features in this statement; and many of the figures would certainly shrink to less noble proportions on the prick of a critical pen. There is one thing in the table, however, which it is difficult to account for—the insertion opposite the name of the electric supply undertaking of the statement as to who are the owners of the gas-works in the district, whether the local authority or a company. We fail to understand the reason for this distinction, unless it arises from a desire to show that the predilection of a locality for electric light has no reference whatever to the public or private ownership of the gas supply. One reflection at least is suggested by these somewhat eclectic data—the capriciousness of electric light speculation. One can, of course, understand the appearance in the list of names of cities and towns familiar in such returns as those of the Registrar-General. But the understanding boggles at the spectacle of electricians making themselves at home (say) in the Ogmore Valley, while so many more populous places as yet seem to know them not. Then, again, certain places, like Buckingham, Galway, and Taunton seem to have taken the infection at an early date—the record does not tell whether they "wish they hadn't," as is sometimes the case with even wealthier centres of population and industry. The statement should be useful to electric light pioneers, as helping to show them the extent of the field yet remaining for them to explore, with more or less advantage to themselves and to the community. The energy of these gentlemen would not be damped by such a suspicion as might occur to the mind of a pessimist in glancing over the names in the table—that not one-half of the listed undertakings standing in the name of the local authority are ever likely to be able to dispense with a rate-in-aid; nor can more of the companies reasonably expect to earn a satisfactory dividend.

A GAS-METER TESTING-STATION.

The subject of gas-meter testing has lately been raised by certain local authorities and persons interested in the novel question of how far the sufficiency of the legal tests applied in this country to consumers' meters is affected by the progress of invention in respect of the automatic control of the gas-measuring apparatus. In some editorial remarks of our own on the subject, it was observed that "gas-meters are actually tested merely for the measuring capacity of the drum"—a statement which was called in question later by Mr. J. Stratford, the Inspector of Gas-Meters under the Corporation of the City of London, who wrote to complain that it did not comprehend all the work actually done at a gas-meter testing establishment. We have since had an opportunity, through Mr. Stratford's kindness, of seeing in operation the station of which he is the head; and we consider that the best way to elucidate the working of the Sale of Gas Act, 1859, at the present day will be to describe, as briefly as possible, the equipment and method of procedure of this particular establishment.

The charter by which gas-meter inspectors in England work is the Sale of Gas Act, 1859, which also applies, with certain executive modifications, to Ireland and Scotland. In this statute, which has never been subjected to important amendment, it is enacted that "no meter shall be stamped which shall be found by the inspector to register or be capable of being made by any contrivance for that purpose, or by increase or by decrease of the water in such meter, or by any other means practically prevented in good meters, to register quantities varying from the true standard measure of gas more than two per cent. in favour of the seller or three per cent. in favour of the consumer;" and the following rules are to be observed by the inspector in testing meters under the provisions of the Act: "Firstly, the meter shall be tested for soundness or leakage only, and not for percentage of error, when fixed on a horizontal base, and with gas under a pressure equal to a column of water three inches high, with a light or lights consuming not more than one-twentieth part of its measuring capacity per hour marked thereon, nor less than one-half of a cubic foot per hour, for all meters of a measuring capacity not exceeding one hundred cubic feet per hour; and not more than one-fortieth part of its said measuring capacity per hour for all meters of any greater measuring capacity per hour than one hundred cubic feet. All meters found to work under such a test shall be deemed sound meters; and any meter found not to work under such test shall not be stamped. The meter to be tested for percentage of error shall be fixed on a horizontal base, and shall be tested at a pressure equal to a column of water five-tenths of an inch high, and passing the quantity of gas or atmospheric air per hour which shall be marked thereon as its measuring capacity per hour; and the water used in such testing, and the air of the room in which such testing shall be made, shall be as nearly as practicable of the same temperature as the gas or air passed through the meter." This is all. The meter is required to be sound outside, under 3 inches pressure; and it must not register more than 2 per cent. fast or 3 per cent. slow when passing gas or air at its stated registering capacity.

In practice, it has been found necessary to test for more than soundness and accuracy of measurement, although the additional tests are really incidental to the compulsory ones, and apply solely to the efficiency of the meter as a gas-measuring instrument. In what we have to state under this head, we must be understood as following the procedure at the City of London testing-station, according to a routine laid down long ago by Mr. Stratford, who has occupied his present office for thirty-five years, and has several assistants with nearly as long service to their credit.

First, however, a few words of description are due to the establishment itself. When the Sale of Gas Act became law, and the Corporation found themselves under the necessity of carrying its provisions into effect, they looked round for a place that could be rigged up to do duty, if only as a strictly temporary measure, for a gas-meter testing-station. They found what would answer the purpose in the Corporation "green-yard" in Lower Whitecross Street; and the Sheriffs' stables were cleared out to accommodate the gasholders prescribed by the Act—a loose-box serving with little or no alteration for the Inspector's office. No one will be surprised to learn that this "strictly temporary" expedient was adhered to for thirty-three years. Within the last year or so, a new testing-station and offices have been erected on the opposite side of the yard; and here Mr. Stratford and his staff are now respectably accommodated. The ground at the disposal of the Corporation for the purpose is not extensive; but, considering all things, they have made the station a fair model of what such a place should be. No money has been wasted in architectural luxury; but the building is dry, well warmed by gas, light, and as airy as the confined situation permits. It contains twelve 10-feet gasholders; two 20-feet gasholders for testing large meters; a standard wet meter for testing consumers' meters *in situ*; and the statutory set of model holders, in three sizes.

The holders and other gas apparatus of the station are of Messrs. Parkinson's manufacture; and, naturally, most of the

new meters that come, in large numbers, to this station for testing and stamping are of London make. The work of the testers is of two kinds—the testing of new or repaired meters for the manufacturers or the gas companies; and the testing of meters of disputed accuracy, for both companies and consumers. It is pleasing to know that the Inspector's verdict is always taken as settling disputes of this kind. It should be observed that, in practice, a slightly different procedure is followed in testing disputed meters, as compared with new and repaired meters. The Act says the test for soundness under high pressure should be made first; and this is done with new and repaired meters. In the other case, it is recognized that to put an old meter, supposed to have something the matter with it, to this severe strain, would defeat the object sought to be attained by the test; and therefore it is tested for accuracy first.

Nothing but gas is used for all tests. The Act says that gas is to be employed for testing for outside soundness; but it implies that air may be passed through to give the registration. For practical reasons, however, gas is to be preferred for all purposes. It is desirable, especially in the case of dry meters, that the fluid measured in a test should be of the same specific gravity as that which is to be measured in practice. It is obvious that, for equal pressures, gas will go where air will not. For old meters, moreover, it would be dangerous to use air, inasmuch as they are already reeking of gas, and continue to give it off for many days after they are opened.

The Act does not state how long meters are to remain under test, nor what quantity of gas should be passed through them in order to afford a proper test of measuring capacity. Actually, the test for outside soundness does not take long. The meter is placed upon the stand, and looked over for patent defects—such as broken index glass, defective index or pointers, or any other shortcoming. A putty joint is made with the holder connections; and the statutory pressure of 3 inches is given by lowering a weight upon the crown of the holder. The operator passes a lighted torch all over the meter while the pressure is on, when any leak would be revealed. The meter is then tested for internal soundness—not passing gas without registration. Care is taken to apply this test in such a way as not to start the meter working; and so high a degree of soundness is demanded that a 100-light meter found to let slip 4 cubic feet an hour unregistered would be condemned. The smoothness of working and the steadiness of light (the latter observed by means of a flat-flame and an argand burner supplied through the meter) are observed when the meter is being tested for registration at the full capacity. Though the Act says nothing about it, meters are always made with a special index for the purpose of testing; and the operator causes this to make one or as many complete revolutions as he may think fit. An experienced tester knows the defects to look out for; and if he discovers anything, such as noisy working, which does not come within the strict interpretation of the law of testing, he makes a note of it. It takes an hour to put an ordinary-sized meter "through its facings." It is, of course, impossible to burn all the gas passed through the meters while testing at full capacity; and owing to this circumstance, and the presence of a number of old meters, the testing-station has a pronounced "gassy" smell, though the building is well ventilated.

Wet meters require more testing than the dry kind. They must be tried at high and low water-line; and also for sufficiency of seal to the central opening at low water-line, lacking which it might be possible for the gas to blow through. It might be possible to discriminate between the gas company's and the consumer's interest in these tests; but no difference is shown in practice—neither the trade nor the gas companies desiring an inspector to pass a meter that is not thoroughly satisfactory in every respect. Mr. Stratford declares that he has found meter makers only too well pleased at being made acquainted with defects which they had overlooked.

There is, for instance, the question of testing the indices. Though several years ago it was thought by the Standards Department of the Board of Trade, and others, that meter indices might be tested to make sure of the correctness of the wheels, &c., Mr. Stratford is of opinion that nothing of the kind is necessary. If indices were to be run by machinery through a complete revolution, such a simple thing as a loose pinion might, after all, give as much trouble as a wheel with the wrong number of teeth. The best safeguard against all index shortcomings is the experienced eye of an examiner, who can detect, from imperfect correspondence of the different pointers with the figures of their dials, when anything is wrong inside.

With regard to the automatic prepayment attachments of meters, these are not taken notice of at the City of London testing-station so long as they do not interfere with the measuring or registering part of the meter. For the purposes of the law, a gas-meter is a gas-meter only. It may be a savings bank as well; but with this the Inspector has nothing to do when the meter passes through his hands. He is careful, however, not to seal a meter in such a way as might permit it to be thought that the coin attachment is covered thereby. It is Mr. Stratford's opinion that the testing of the coin-control fitting, which has no connection with accuracy of gas measurement, but depends upon a movable price datum, cannot be an affair of a gas-meter inspector. At any rate, a fresh Act of Parliament would be required to bring such things under official test; and while the practical advantages of any arrangement of the kind would be problematical, the hindrance to business caused thereby would be considerable and unavoidable.

In concluding this necessarily sketchy account of the equipment and working of a modern gas-meter testing-station, it is only right that recognition should be made of the practical wisdom of the framers of the Sale of Gas Act, 1859. It is no small credit to those who drafted the measure in question that, from the time of its passing into law until now, it should have proved so competent to secure its objects, that nobody asks to alter it, notwithstanding the enormous and strange developments that the meter trade has received in this period.

PERSONAL.

Mr. A. H. Lock has succeeded Mr. E. Burnett in the chairmanship of the Dorchester Gas Company, that gentleman having resigned the position.

Mr. R. Evans Prall has been appointed Secretary of the Higham and Hoo Water Company, in succession to his father, the late Mr. Richard Prall.

Mr. W. Peed, the Secretary of the Cambridge Water Company, has, in consideration of increased duties through the development of the Company, had his salary increased to £210 per annum.

M. Moissan, whose name is familiar to our readers in connection with his work with the electrical furnace and the production of calcium carbide, has been elected President of the Chemical Society of Paris.

At the ordinary meeting of the Institution of Civil Engineers last Tuesday, the monthly ballot resulted in the election of 40 associate members, among whom were Mr. G. R. Love, of the Dundalk Gas-Works, and Mr. Henry Woodall, of Palace Chambers, Westminster.

Sir Henry Roscoe is mentioned as the probable successor to the late Sir Julian Goldsmid in the Vice-Chancellorship of London University. His nomination would be a distinctly popular one, as Sir Henry has a long record as an educator; and the making of the Victoria University was largely due to his influence when a resident at Manchester.

Mr. Albert Ford, who succeeds Mr. H. W. Smith in the management of the Singapore Gas-Works, has been presented with a silver cigarette case, by the Chairman (Mr. G. R. Ward) of the Great Marlow Gas Company, on behalf of the Directors, as an expression of their appreciation of his courtesy during his stay in the town, where he was engaged in remodelling the gas-works under Mr. A. F. Phillips, M.Inst.C.E.

Mr. T. Wilkinson has resigned the managership of the Carnarvon Corporation Gas-Works, which he has held for three years. Mr. Wilkinson was for some time Manager and Secretary of the Newmarket Gas Company, and was subsequently Manager of the Halstead and Tamworth Gas Companies; going from the last-named place to Carnarvon. The severance of his connection with the historical Welsh town arises rather from personal than professional considerations.

Mr. Harrison Veevers, as many of our readers are aware, until lately held the positions of Gas Engineer and Surveyor to the Dukinfield Corporation. The peculiar way in which the separation of the offices was effected almost justified the inference that some dissatisfaction was felt at the manner in which the duties of the surveyorship were being discharged. It has now been clearly explained that this was not so; but that the sole reason for making the change was to enable Mr. Veevers to devote himself solely to the increasing work of the Gas Department.

OBITUARY.

Dr. Weeks, J.P., who has lately died, was on the Board of the Brompton, Chatham, and Gillingham Water Company. Deceased had held various public appointments.

Mr. Alfred Fraser, M.Inst.C.E., only son of the late Mr. Alexander Fraser, M.Inst.C.E. (Chief Engineer of the Grand Junction Water Company), died at his residence at Ealing on the 6th inst., after a few days' illness, in his 44th year.

Mr. T. J. Jones, whose death, at the age of 85, has been announced, was one of the original founders of the Wrexham Gas Company and was for some years a Director. He was also a borough and county Magistrate.

Mr. R. Robertson, the Manager of the Bathgate Gas Company, died suddenly at his residence, Parkhead House, Bathgate, at about five o'clock last Friday morning. In the winter of 1894-5, he had a severe attack of influenza, and never entirely recovered from it. Mr. Robertson was the President of the North British Association of Gas Managers in 1891, when the annual meeting of the Association was held in Edinburgh. In Bathgate he was held in high esteem. He was ex-Bailie of the burgh, had been Dean of Guild, a member of the Parish and County Councils, and of the Burgh School Board. In addition to being Manager of the Gas Company, he was the leading partner in a firm which carried on a large ironmongery and gas-fitting business in the town. He had been in business in Bathgate for upwards of thirty years. He was about sixty at the time of his death. He is survived by a widow and a grown-up family.

DAMAGE TO WOOD PAVEMENTS FROM LEAKY WATER-MAINS.

THE action brought by the St. Olave's Board of Works against the Southwark and Vauxhall Water Company seems to have been altogether mistaken and misconceived. It is always dangerous to launch legal proceedings without counting the cost, and ascertaining the evidence that will be available in due season to give support to the claim. Nevertheless these rudimentary considerations—the first principles, so to say, of prudent litigation—were disregarded by the St. Olave's Board of Works. Their error, however, is not without precedent. When a man has to depend upon his own purse for the sinews of law, he is apt to move with caution. When a public body have the ratepayers behind them, the curb on the litigious spirit is infinitely less powerful. Hence a good deal of the litigation which is embarked upon in haste, and repented of at leisure, where the penitents know that they can escape from the discomfort of a depleted bank-balance. In point of pocket, vestrymen, aldermen, and councillors personally are never a penny the worse for their adventurous lawsuits.

The particular action which calls forth these general reflections was based on the alleged negligence of the Southwark and Vauxhall Company in relation to an overflow of water from one of their pipes. The overflow necessitated some repairs to the wood-paving in Church Row, Bermondsey; and that undisputed fact appears to have been regarded by the Board of Works as a sufficient justification for rushing headlong into law with the Water Company. The answer of the defendant Company was plain and simple. In the first place, they pleaded that there was no negligence on their part; secondly, that, if the water came from their pipe, it was due to the memorable frost; thirdly, they said that their pipes were laid under statutory authority, and that they were not liable for the damage in question. The Water Company were in no difficulty as to establishing their defence; but the plaintiffs saved them the trouble of calling witnesses. Their own principal witness, Mr. Thompson, the Surveyor to the District Board, purports to have given evidence in support of the plaintiffs' case. In reality, Mr. Thompson put—and was constrained to put—his employers out of Court. He stated his opinion that the real cause of the escape of water was the action of the celebrated frost on the wooden plug, causing it to slip out of its socket. The witness added, frankly enough, that he did not think that either party had been guilty of negligence. After this, as might naturally be supposed, there was really an end to the case. The plaintiffs' Counsel was obliged to confess that, in the face of such a statement from his own witness, he could not persist in the allegation of negligence on the part of the Company.

The position was not without the element of humour; for the District Surveyor had been called, like the prophet of old, to curse the enemy, but behold! he had blessed the Company altogether. Counsel, it is true, made a feeble attempt to attack the Company in flank; but he was easily beaten off. Apart from negligence, he argued, section 112 of the Metropolis Local Management Act, 1855, imposed a liability upon the Water Company. The retort was ready and obvious, that any proceedings based on the Act in question must be taken in accordance with its provisions. It is not open to Vestries and other illogical bodies to bring a civil action, and when their case collapses to turn round and then and there smite their opponents with a statute of a *quasi*-penal character which can only be enforced in a Court of Summary Jurisdiction. Mr. Justice Mathew had no difficulty in disposing promptly of the whole case. The defendants' statutory powers, said his Lordship, gave them the right to place the main in the street; and, in the absence of negligence, the action would not lie. As to the alleged remedy under the Metropolis Local Management Act, the learned Judge simply pointed out that plaintiffs had not adopted the procedure which that Act prescribes. In the result, therefore, there was judgment for the defendant Company with costs. But seeing that the District Surveyor's account of the matter must have been known, or could with proper inquiry have been known, at the outset, how did it happen that this unwarrantable and expensive action was launched, and persisted in until the time of its inevitable collapse in open Court?

British Association of Water-Works Engineers.—We are informed by the Secretary (Mr. R. Macintyre) that the official address of this Association is Palace Chambers, No. 9, Bridge Street, Westminster, S.W., to which all communications may now be forwarded.

The Tokio Pipe Contract.—Some months ago, the "Ironmonger" gave an interesting account of the procedure in connection with the placing of the contract for the Tokio water-pipes with a Scotch firm, and then with a Japanese concern. That account our contemporary appropriately supplements by the statement that nearly all the members of the Japanese company which secured the order are now in prison on a charge of having laid 800 tons of defective pipes, whereby the Municipality have been defrauded to the tune of about a million yen. This is a very curious end to local enterprise, and a somewhat striking example of Japanese progress—in a certain direction.

NOTES.

The Measurement of High Temperatures.

The "JOURNAL" for the 31st of December last contained a reference (p. 1349) to the melting-point of Dinas fire-bricks, which was stated, on the authority of two writers in *Stahl und Eisen*, to be from 3880° to 3930° Fahr. A correspondent in the "JOURNAL" for the 21st ult. (p. 134) suggested that it would be interesting to know how such high temperatures were measured; and we are now able to lay before our readers an outline of the method employed in the testing of the Dinas bricks. Seger's standard fusible cones were used to determine the temperatures at which fusion occurred. These cones are tetrahedra compounded of mixtures of clay and sand with certain fluxes. For temperatures from 1300° to 1700° Fahr., soda and lead oxide form the flux; while boric acid is used for temperatures from 1700° to 2050° Fahr. The same flux is used with gradually increasing proportions of alumina and silica up to 3450° Fahr. The last cones of the series, which are stated to fuse at temperatures from 3500° to 3950° Fahr., consist of pure aluminium silicate. The points of fusion of the fire-bricks were found by heating slips about an inch long and a quarter of an inch thick in a Deville's furnace along with one of the standard cones. The experiment is repeated until a cone is tried which melts nearly simultaneously with the slip of fire-brick; and the temperature of fusion of the cone, and hence that of the fire-brick, is known from the position of the cone in the series.

A New Method in Pyrometry.

M. Berthelot has been experimenting with a new method of determining temperatures, with a view to eliminating the uncertainty of the gas-thermometer arising from the unknown or irregular expansion of the containing vessel. His aim was to discover a method of employing the expansion of a gas to indicate its temperature, independent of the form and dimensions of the containing vessel. The principle selected was that of the refraction of a gas, which is always exactly proportional to its density. A given refraction always corresponds to a given density, though the pressure and temperature may be different. The principle is applied by the method of interference. A luminous beam is split up into two parts, which traverse two tubes filled with the same gas, and the initial position of the interference fringes is noted. One of the tubes is then raised to the temperature which it is desired to measure—the pressure remaining constant, and being equal to that of the atmosphere. As the density of the gas diminishes, the interference fringes become displaced. By reducing the pressure of the gas in the second, or cold, tube, the fringes are brought back to their initial position; and this means that the density is then the same in both tubes. Now the density of the gas in the cold tube is known from its pressure. Hence the density in the hot tube is also known; and from this the temperature is deduced. The method is thought to be well adapted for the measurement of high temperatures, such as those of furnaces.

Light Emission at High Temperatures.

The "Chemiker Zeitung" gives the essential points of a communication ("Wied. Ann.," LVI., p. 433), by C. E. St. John, on the light-emissive powers of various substances at high temperatures, and the action of the Welsbach mantle. It does not seem possible, at first sight, that the mantle should emit so bright a light, rich in refrangible rays, in virtue of the temperature alone, in conformity to Kirchhoff's law; or, in other words, that it is a simple thermactinic instrument. The hypothesis was promulgated, therefore, that the Welsbach mantle had a certain amount of energy stored up in it, which was given out again on the application of heat, and increased the radiation—causing the mantle to reach a state of incandescence. In order to investigate this case (which would have been an exception to Kirchhoff's law), researches were undertaken by C. E. St. John. In the first instance, he examined the various constituents of the Welsbach mantle—the oxides of lanthanium, yttrium, magnesium, and zirconium—as to their emitting power in a furnace at a temperature of 2000° to 2200° Fahr. The brilliancy was compared for five different wave-lengths, by means of a spectrophotometer. The results showed that the illumination was caused only by the raising of the temperature, or that the intensity of the oxides in question is the same as that of other bodies, such as platinum. The emitting power, however, was very great. The principle of the Welsbach incandescent light appears, therefore, to depend on raising to incandescence, in the hottest part of a Bunsen flame (about 3100° Fahr.), a fire-resisting mantle of small bulk, low conductivity, large surface, and great emitting power. The diminution in illuminating power which occurs with the lapse of time, is to be attributed to the reduction in the area of the radiating surface of the mantle by continued use, and the consequent decrease in the total light emitted. The microscope confirms the reduction in size of the filaments which a state of incandescence effects.

The Elementary Composition of Petroleum.

C. Engler and L. Jezioranski give in "Deut. Chem. Oes. Berichte" (XXVIII., p. 2500) a further contribution on the constituent hydrocarbons of petroleum. From earlier investigations, principally carried out on the fractions boiling under 320° Fahr., it

has been concluded that American, Galician, and many other petroleums consist chiefly of saturated hydrocarbons of the marsh gas series, and that Russian oil consists of the hydrocarbons known as naphthenes. The experiments of Engler and Jezioranski carried out on fractions boiling above 390° Fahr. controvert these assumptions. The ratio of the carbon to the hydrogen, and the percentage of unsaturated hydrocarbons, increase with the rise in boiling-point; and the amount of saturated hydrocarbons cannot be large in any case in the higher fractions. The researches lead to the conclusion that the portions boiling under 300° Fahr. consist chiefly of saturated hydrocarbons, which also preponderate in the portions boiling between that temperature and 390° Fahr.; but that in the portions boiling above 390° Fahr., unsaturated hydrocarbons occur in the largest amount. It seems that a considerable proportion of the hydrocarbons in the higher fractions must be even poorer in hydrogen than those of the ethylene series.

Crushed Coke for Briquettes.

It would be interesting to know whether any systematic attempts have been made to put crushed coke briquettes upon the market. They do not occur in the list of substances enumerated by Mr. W. Colquhoun in his Institution of Civil Engineers paper upon briquette manufacture and machinery. At first, on the European Continent, only small coal was made into briquettes; but the demand for fuel in this form has so largely increased that coal is now in many places crushed or disintegrated for the purpose of being made into briquettes. The same process might be found advantageous for disposing of coke, especially with a view to domestic consumption. So prepared, coke would burn as freely as bituminous coal. The pitch used for agglomerating briquettes must not have had its binding qualities destroyed by the removal of its anthracene and heavy oils. A suitable pitch should soften at 75° C., melt at 100° to 120° C., remain hard at the normal temperature, and be capable of carriage in bulk. Its fracture should be dead black, conchoidal, clean, and soft, without being greasy to the touch; and the edges should not splinter when bitten by the teeth. A cheaper and less smoky agglomerating material than pitch is desirable; but, so far, no acceptable substitute for it has been found.

The Temperature of the Bunsen Flame.

At the Berlin Physical Society recently, Professor Warburg gave a short account of some experiments conducted by W. J. Wäggener to determine the temperature of the flame of an atmospheric gas-burner. The measurements were made with carefully-tested Le Chatelier thermo-electric elements; and their accuracy was further tested in two directions: Firstly, with reference to the effect of high temperature upon the electromotive force of the element, when it was found that prolonged heating makes the platino-iridium wire more markedly irregular than in the case of the platinum element. Hence the element was exposed to the heat of the flame for a short time only. Secondly, tests with wires of different thickness were made to ascertain the best form for securing uniform results. The thinnest wire (0·05 millimetre) gave the highest values in the outer edge of the flame, and in the zone of active combustion; but a lower value in the inner cone than that given by a 0·1 millimetre wire. The highest temperature found was 1704° C. Taking the highest readings of the four different-sized wires used, and representing them graphically, a curve was obtained which gave the value 1750° C. for a wire of zero thickness—not much below the melting-point of platinum (1780° C.)

The Combustion of Acetylene.—Mons. H. Le Chatelier finds that mixtures of acetylene with air containing a proportion of the gas below 7·74 per cent. burn, yielding carbonic acid and water, with a yellowish flame feebly luminous. For proportions of acetylene between 7·74 and 17·37 per cent., the flame is of a pale blue, with a slight yellowish halo. The products of the combustion are carbon dioxide, carbon monoxide, aqueous vapour, and hydrogen. If acetylene is burnt with an equal volume of oxygen, it gives a temperature of 4000°; consequently superior by 1000° to the mixture of oxygen and hydrogen. The products of combustion consist exclusively of carbon monoxide and hydrogen—both reductive gases.

Society of Engineers.—The first ordinary meeting of the Society for this year was held on Monday last week, at the Royal United Service Institution, Whitehall. Mr. W. G. Peirce, the President for 1895, occupied the chair, and presented the premiums awarded for papers read during the year. Among them was the President's Gold Medal to Mr. R. E. Middleton, for his paper on "The Relative Value of Percolation Gauges;" and, as already mentioned, a Society's Premium to Mr. W. T. Sugg, for his paper on "Ventilation and Warming." Mr. Peirce then introduced the President for the current year, Mr. S. H. Cox, to the meeting, and retired from the chair; receiving a hearty and unanimous vote of thanks for his services. Mr. Cox's address was devoted to a review of the gold-mining industry from an engineering point of view. He mentioned, however, that, while the finances of the Society were flourishing, there had been a slight falling off in membership, probably accounted for by the depression in the engineering world during the last year or two. At the end of 1894, the roll contained 502 names; and at the close of last year, 492.

TECHNICAL RECORD.

THE INCORPORATED INSTITUTION OF GAS ENGINEERS.

In order to comply with the regulations, the Annual General Meeting of this Institution was commenced last Saturday, at the Offices, No. 11, Victoria Street, S.W. The PRESIDENT (Mr. C. C. Carpenter, the Engineer of the Vauxhall Station of the South Metropolitan Gas Company) was in the chair; but, as usual on these occasions, only a few members attended.

CONFIRMATION OF MINUTES.

The SECRETARY (Mr. T. Cole) read the minutes of the annual general meeting held on Feb. 9 last year, and of the adjourned meeting in May; and they were confirmed.

NEW OFFICERS AND MEMBERS.

The Scrutineers (Messrs. T. S. Lacey and A. C. M'Minn) then proceeded to examine the ballot-lists for the election of office-bearers for the ensuing year; and afterwards reported the appointment of the following gentlemen:—

President—Mr. William Foulis, of Glasgow.

Vice-President—Mr. Corbet Woodall, of London.

*New Members of Council**—Mr. W. W. Fiddes, of Bristol; Mr. A. C. M'Minn, of Kensal Green; and Mr. G. E. Stevenson, of Manchester.

Auditors—Mr. Magnus Ohren, of Sydenham; and Mr. Alfred Lass, of London.

* The other members of Council are: Mr. J. F. Bell, of Stafford; Mr. C. Gandon, of Lower Sydenham; Mr. W. Hardie, North Shields; Mr J. W. Helps, Croydon; Mr. G. T. Livesey, London; and Mr. J. Young Etruria.

The Scrutineers also reported that the following gentlemen had been admitted to the Institution:—

Member—Mr. C. B. Newton, of Carlisle.

Associate—Mr. James Randall, of Tottenham.

On the motion of the PRESIDENT, the Scrutineers' report was adopted.

The PRESIDENT then declared the meeting adjourned to Wednesday, May 13, at the Institution of Civil Engineers.

THE ACETYLENE THEORY OF LUMINOSITY.

At the Meeting of the Chemical Society on the 16th ult.—Mr. Vernon Harcourt (the President) in the chair—Professor VIVIAN B. LEWES, F.I.C., F.C.S., presented a paper on the above subject. It had been prepared for reading; but, owing to the author's indisposition, he was only able to direct attention to portions of it. By the Society's rules, we are precluded from giving the full text of the paper until it has appeared in their "Journal," which will not be for some few weeks; but we are in a position to reproduce the official abstract and the report of the discussion, which were issued to members on the 3rd inst.

The author points out that, in 1882, Professors Dewar and Liveing came to the conclusion that the "formation of acetylene in ordinary combustion seems to be the agent through which a very high local temperature is produced;" while Guéguen claims to have put forward the acetylene theory of luminosity in 1884.

The author considers that the criticism offered against the acetylene theory by Smithells* in no way affects the considerations upon which the theory is based, which are: (1) That the unsaturated hydrocarbons in the inner region of the flame are largely converted into acetylene before luminosity commences. (2) That acetylene develops luminosity when heated while flowing through a hard glass tube; no air being present. (3) That the temperature necessary to decompose acetylene with evolution of light does not raise to incandescence the carbon liberated by the decomposition. (4) That in luminous hydrocarbon flames of sufficiently high temperature, the luminosity varies directly with the amount of acetylene present at the point where luminosity commences.

The objections raised by Smithells against the determination of absolute temperatures in flames by means of the Le Chatelier thermo-couple are warmly endorsed by the author as far as those portions are concerned in which combustion is taking place; and these objections were pointed out in a former paper (Proc. Roy. Soc., lvii., 452).† But he contends that the results obtained in the inner non-luminous portion of a hydrocarbon flame are probably fairly accurate; and the results given by Smithells fully confirm the statement that the temperature in the inner zone rises from a comparatively low temperature close to the burner to over 1000° at the apex of the zone.

The author describes experiments showing that, although the heat of combustion of acetylene is very high, so small a proportion has to be burnt, in order to develop the remaining energy as light and radiant heat, that it by no means follows that the acetylene flame is hotter than, or even as hot as, a coal gas or ethylene flame of the same size.

* See *ante*, p. 74. † See "JOURNAL," Vol. LXV., p. 796.

Smithells has come to the conclusion that the statement that cyanogen could be made to undergo luminous combustion has arisen from a yellow ammonia flame having been mistaken for one containing solid carbon. The author shows that, by surrounding the cyanogen flame by nitric oxide, intense luminosity and a copious deposit of soot can be obtained.

The author contends that the flame is in reality divided into two zones—viz., (1) the outer sheath of combustion, and (2) the inner region of non-combustion—and that the latter consists of an internal portion in which radiant heat is converting the hydrocarbons into acetylene; a luminous envelope which caps it, and in which more intense heat is decomposing the acetylene with emission of light; and the blue calyx at the bottom of the inner zone, where the hydrocarbons are undergoing decomposition by water vapour and carbon dioxide, without previous separation of carbon.

The author also contends that the incandescent carbon particles in the upper portion of the flame are acted upon by carbon dioxide and water vapour, forming carbon monoxide and hydrogen; and that this action tends far more than combustion by the air to prevent their escape from the flame.

In the discussion upon the paper

Professor SMITHELLS said he had always considered the acetylene theory ingenious, and feared indeed that its very attractiveness had led Professor Lewes to a one-sided and, in many cases, an erroneous interpretation of evidence. The question was not whether the explanation of luminosity afforded by the acetylene theory was conceivable, but whether the theory was really in harmony with ascertained facts; and this question, he still thought, was to be answered decidedly in the negative. As Professor Lewes had not read the whole paper, but had only drawn the attention of the meeting to certain points, he was unable to say to what extent Professor Lewes had dealt with the series of objections raised to the theory; and his remarks must not, therefore, be regarded as pretending to be a complete reply. He wished that Professor Lewes would state explicitly what view he had as to the structure of an ordinary gas-flame. Did he or did he not accept the old and generally accepted view, that the flame consisted of three distinct parts—a luminous region, a mantle, and a blue calyx at the base? Professor Lewes had attempted to define the parts of flame by reference to temperatures; and whereas at one time he indicated the mantle as the region of lowest temperature, he now appeared to agree that it was the hottest part. Did he still maintain temperature measurements to be a reasonable basis for defining the anatomy of the flame? He (Professor Smithells) did not consider that Professor Lewes had explained the extraordinary discrepancies that had been pointed out in his measurements of temperature; and he should like to know whether Professor Lewes had used the thermo-couple, as shown in the apparatus before them, or whether he had not, as implied in his previous papers, inserted the twist of the thermo-couple in a manner now admitted to be improper. He still thought that it was misleading to speak of 80 per cent. of the unsaturated hydrocarbons as being converted into acetylene within the flame. If acetylene were the source of light, and if the light depended upon the almost explosive character of its decomposition, there surely was some reason to ask for evidence that a mixture of gases containing 1·4 per cent. of acetylene, 0·5 per cent. of other unsaturated hydrocarbons, and 98 per cent. of other gases (four-fifths of which were incombustible), could afford light in the manner stated. He considered that such a doctrine was incredible. The evidence now adduced by Professor Lewes to show, not that the acetylene flame was comparatively cool, but that conceivably it might be so if the fact were not otherwise, was very remarkable. He could not exactly say what was the mechanical equivalent of light, but his recollection was that it was extremely small; and he advised Professor Lewes to look into what was known on this subject before committing himself to the view that the acetylene flame lost so large a fraction of its total energy in the form of light. However, this seemed to be a matter of little consequence, for there was no getting over the fact that the acetylene flame was surrounded by a mantle of extremely high temperature, and that a platinum wire introduced into it glowed at least as brightly as the carbon within the flame. This being the case, there was no occasion to explain that, hypothetically, the flame might be cool. With regard to the cyanogen flame, he had nothing to withdraw from what he had said on a previous occasion, though he gladly congratulated Professor Lewes on having now made a new and interesting observation. He had entirely failed to obtain evidence of carbon being separated in a cyanogen flame surrounded by burning hydrogen; and Professor Lewes had not shown that it was separated. The use of nitric oxide, which would, in its luminous result, remind them of the behaviour of that gas towards carbon disulphide, undoubtedly led to the separation of carbon, and supplied a piece of evidence which Professor Lewes was now entitled to claim. Much circumstantial evidence, believed by Professor Lewes to favour the acetylene theory, had been adduced. Among it, was a calculation which, having a striking practical aspect, might have considerable influence on some minds; and he desired to ask Professor Lewes to explain and justify it. It was intended to give the theoretical illuminating value of ethane, ethylene, and acetylene respectively, on the supposition that, in giving light after passing through the state of acetylene, they were resolved into carbon and hydrogen; and this calculation gave results in tolerable agreement with the illuminating value of the gases as determined by the photometer. The calculation was, he thought, unintelligible from a scientific point of view; but, even if the principle were admitted, it seemed not only incorrectly made, but capable of affording a set of numbers entirely at variance with practical measurements just as easily as numbers in harmony with them. He thought some explanation of this was due from Professor Lewes. He would only, in conclusion, say again that his remarks must not be taken at all as his complete answer to Professor Lewes, whose manner of presenting his paper had rendered this impossible.

Professor RUCKER thought the use of a thermo-couple in a flame above the melting-point of one of the metals was open to grave objection, on account of the uncertainty as to the temperature which the junction actually attained. The validity of Professor Lewes's experiment on the thermal value of the luminous radiation depended upon whether the whole of the non-luminous radiation had been absorbed in the comparison experiment. This in turn depended in part on the dimensions of the apparatus. By the solution of a small quantity of an iron salt, the absorptive power of the water would have been increased, while the light would not have been very largely diminished.

Professor THORPE remarked that a possible fallacy might underlie the deductions as to temperature drawn from the behaviour of a platinum wire in a flame containing free carbon and carbonic oxide, on account of the specific chemical action which those substances might exert on the metal. The fact that a platinum wire would melt even in an ordinary candle-flame, which was not particularly hot, was, he said, known to Smithson Tennant, and was referred to by Davy in his well-known paper. Davy also found that a filament of platinum could be fused by a flame of cyanogen in air, whereas the same wire was not melted by a hydrogen flame.

Mr. GROVES drew attention to the statement made by Professor Lewes that the yellow light emitted by a jet of cyanogen, when surrounded by a hydrogen flame, was due to carbon liberated by the decomposition of the cyanogen; and he suggested that, if the image of the sun were thrown on to this flame by means of a lens, and the reflected light examined by methods familiar to physicists, it would be easy to ascertain whether or not the flame contained solid particles. In that case, not only would the light be found to be polarized, but, if examined spectroscopically, would exhibit the Fraunhofer lines. If the flame contained no solid particles, then the luminosity could not be due to liberated carbon. On the other hand, even if it were found to contain solid particles, it would not necessarily follow that these were carbon.

The PRESIDENT referred to a suggestion of Professor Lewes that the great output of light from the acetylene flame might leave the flame itself comparatively cool. He thought that, of the energy made kinetic by chemical changes within the flame, only a small part radiated out in waves of such length as to be light. The small carbon particles in the flame lost much heat by radiation, and would thus be cooler than the non-radiating gases in which they floated. It was agreed that the outside of a flame was the hottest part. One of the causes of the splendour of the flame of pure acetylene was, no doubt, the high temperature to which the separation, as well as the oxidation, of the carbon and hydrogen contributed. But a suitable burner was necessary. The flame must have a large outer surface; and close within this must be spread over the whole frontier the little particles of carbon which glowed for an instant and disappeared. Among the causes which made the flame of one gas brighter than that of another, might be a difference in the size and number of these solid particles. As one salt gave a large-grained and another a small-grained precipitate, so it might be with decomposing hydrocarbons; and as a given quantity of platinum wire coiled into a spiral and held in a bunsen flame would yield more light the smaller the gauge, so the finer dust of carbon might make the brighter flame. Some idea of the proportion between the surface of the flame and the actual surface of the glowing particles to which its light was due, might be gained from a comparison with the filament of an electric glow-lamp. The radiating substance was similar in both cases; and when the filament and current were such that the glow-lamp gave light of the same amount and colour as the gas-flame, it was likely that the glowing surfaces producing the light had a similar area.

Professor LEWES, in reply, extremely regretted not having read his paper *in extenso*, as it contained answers to most of the objections that had been advanced by Professor Smithells. His views as to the structure of an ordinary gas-flame were that it contained four parts, but that three of these—viz., the non-luminous inner zone, the luminous sheath, and the blue calyx—were portions of the region in which no combustion, in the ordinary acceptation of the term, took place; while the outer mantle of the flame was the region of intense combustion, and was undoubtedly the hottest part of the flame. In a paper read in 1892,* he had given a description of the structure of a gas-flame; but, in criticizing this, Professor Smithells had evidently overlooked the fact that the portion of the paper

* See "JOURNAL," Vol. LIX., p. 795.

following the description was devoted to an investigation as to the causes which led to the non-luminosity of hydrocarbon flames. This showed that the outer envelope must be the hottest portion of the flame. But it was also manifest that the outer side of this mantle must be rapidly cooled by admixture with air and products of combustion; so that the maximum temperature would be near the inner side of this region. It was the extreme outer portion of this zone which he had described in the words criticized by Professor Smithells. He thoroughly agreed in condemning any temperature measurements of those portions of the flame in which active combustion was going on; but he still believed in the measurements obtained in the area of non-combustion. Professor Smithells had pointed out that serious discrepancies existed between the temperatures recorded in a flat flame in the 1892 paper and in the 1895 paper. But as the one was from a No. 6 Bray, while the other was given by a No. oooo Bray, it was difficult to understand on what grounds it could be expected that they would show any agreement, as the temperatures varied for every alteration in the size of the burner, and for every variation in the pressure at which the gas was burnt. One of Professor Smithells' strongest points was that it was misleading to speak of 80 per cent. of the unsaturated hydrocarbons being converted into acetylene within the flame. The statement he (Professor Lewes) had made was that 80 per cent. of the unsaturated hydrocarbons at the point just before luminosity commenced consisted of acetylene. If a mixture of 1·5 per cent. of acetylene and any gas which had a non-luminous flame were burnt, no luminosity would be generated, and no trace of acetylene would be detected at the top of the inner zone—it having been consumed before the temperature necessary for its decomposition was reached. But if 1·5 per cent. of acetylene were led into the top of the inner zone of a flame of coal gas from which the unsaturated hydrocarbons had been absorbed, this addition would make the flame as luminous as if the unsaturated hydrocarbons had not been withdrawn; and he thought that Professor Smithells' doubt as to the truth of the acetylene theory was based largely on a misconception of this point. With regard to the experiments to show that a flame radiates a considerable amount of energy when emitting light, he was perfectly in accord with those who pointed out that the amount of energy converted into light was but small. There was also a large amount of heat radiated; and the experiment with the blackened bulb would give the total radiation cut off by the opaque coating, which, when the flame was radiating freely, would be lost to the flame. It would be preposterous to lay any great stress on this experiment, as the products of combustion were practically escaping uncooled. In a former paper he had made a calculation to show that a ratio existed between the heat of formation of a hydrocarbon and its illuminating value; but he had been careful to point out that, in the present absence of knowledge as to the heat-relations existing at high temperatures, any such calculations were valueless, except as showing that the greater the endo-thermic value of a compound, the higher was its illuminating value. Professor Smithells concluded that, because a platinum wire held in the outer shield of a flame glowed with the same incandescence as the carbon particles in the flame itself, therefore there was no need to assume any other source of heat than that given by the combustion going on in the flame walls. He (Professor Lewes) thought this conclusion was based upon at least two fallacies. In the first place, Professor Smithells had himself clearly pointed out that there was a temperature gradient on the horizontal plane in which there was an abrupt rise in temperature from the luminous sheath to the point of maximum combustion in the external envelope; and it therefore followed that the platinum wire held in the external envelope must be heated to a higher temperature than the carbon particles in the luminous sheath. Secondly, the conclusion was based upon the assumption that the emissive power for light of carbon and platinum was the same, which was highly improbable. It had been shown that metals at high temperature reflect light; and he thought it quite possible that some of the apparent brightness of the platinum wire might be due to light reflected from the luminous veil in front of which the wire was placed.

Gas Engineering Society.—Some few months ago a small Society was formed, under the above title, for young gas engineers not actually holding appointments as gas managers, and for assistants. Its objects were to arrange for the delivery of lectures on special subjects connected with gas manufacture, the reading and discussion of papers, and the visiting of gas and other works. The Society, of which Mr. George Livesey is Hon. President, has hitherto been privately conducted; but the Committee believe that its scope and usefulness might be much increased by an enlarged membership. The Secretary (Mr. E. D. Weippert, of No. 6, Weigall Road, Lee, S.E.) will therefore be pleased to hear from anyone who is desirous of co-operating with them. Several well-known gentlemen are honorary members, some of whom have promised to give lectures. One of these, on "Burners," will be delivered to-morrow evening, in the small hall attached to the Welsh Wesleyan Chapel in the City Road, by Mr. J. M. Somerville, and others are at present being arranged for.

WARNER AND COWAN'S WET GAS METERS.

In the issues of the "JOURNAL" for June 4 and Dec. 31 last were published, in the usual columns, the specifications of patents Nos. 4504 and 25,257 both of 1894. These patents relate to further improvements in the well-known drum or wheel of the patentees, and may be considered as a further development of the Warner and Cowan system. They have, however, distinctive features of invention; and though there is not the great novelty of the original patent, yet in an examination of the improvements now fully completed there is much to interest.

The essence of the patents is in the form of chamber employed for abstracting—the segment of a cylinder, the capacity of which other than that by change of water-line, is unaffected through the entire action. This form of chamber may be employed, as shown in the specification, in several ways—separately, in various combinations, constructed in the form of an "inner wheel," and arranged also as a supplementary wheel to an ordinary meter. There is a further development of the principle claimed—a spirally formed abstracting-wheel. The advantages claimed for the improvements are: Uniform capacity of chamber; greater freedom of water-way; simplicity of construction in chamber and wheel—two chambers only being employed instead of four. In the examination of these several matters, it is needful to refer to the old system of the patentees—the abstraction of the surplus gas by the employment of an "inner wheel" of like construction to the ordinary meter-wheel.

The principle of the 1874 invention, as is well known, is the taking back of a portion of the gas passed by the drum, and returning the same to the inlet of the meter. This taking back is effected by means of chambers varying in capacity directly as the chambers of the drum or wheel. The abstracting chambers for the taking back are arranged in the form of a wheel of like construction to the ordinary wheel—much smaller in diameter, and rather more than half its depth. Its partitions and inlet and outlet passages are reversed, so that the current of gas is passed through in the opposite direction to that of the wheel proper, in which the small or "inner wheel" is fixed.

This combined drum or wheel—the larger or "major" wheel with four chambers, and the smaller or "inner" wheel with four chambers, and each of these in communication with a chamber of the major wheel—was followed by several modifications of the same principle from time to time by other makers. In all the modifications of the principle of compensation of a varying volume by a varying chamber, each of the chambers of the wheel has direct communication with a separate and distinct abstracting chamber of varying capacity—varying with the chambers of the wheel through the change of water-line. This general practice is probably based upon the theory that, as there must be a continuous flow, so each chamber must be dealt with, as the capacity of each varies with the variation of water-line. The fallacy of this has been discovered by Messrs. Warner and Cowan, and may have been of service to them in their labour of improvement. They say the functions of the two operations are different—the flow must be continuous through the wheel, but the withdrawal of the excess of volume may be intermittent.

Though in the several modifications made of the compensating wheel, the original principle of the patentees has been adhered to, of having a separate abstracting chamber to each measuring chamber, there has not been the same common opinion held as to the form of chamber for this work. It is not proposed to enter into the relative merits of the several forms adopted. The form of the chamber itself, a quarter of the inner wheel, as in the original patent, is the only perfect form that can be employed—that is to say the chamber only, excluding the partitions and the inlet and outlet passages. In this condition, the form of chamber is a simple segment of a cylinder; and this must be the type—the only true form of abstracting chamber when arranged around the axis of a meter.

When it was found that the only defect of the wheel, otherwise so admirably arranged for doing its delicate work, could be removed by the use of another wheel with the same defect as the wheel itself, attention was diverted perhaps from an inquiry into its otherwise perfect fitness for the work. A chamber of the ordinary wheel, with its well-balanced hoods on its two opposite sides, adjusting themselves to the varying water-line without affecting the full chamber of gas, works under very different conditions to the chamber of a wheel with a radius not much above the water-line of the meter. The diagrams figs. 1, 2, and 3 illustrate this. Fig. 1—a much smaller scale than the other figures—shows (looking at the back of the meter) one chamber *Z* full of gas, which has entered through the hood A, now closed, as well as the outlet B, through which the gas will be discharged upon the wheel moving into the position indicated by the dotted lines. It will be observed how perfectly adapted are the several parts to the varying water-line, the chamber full of gas being unaffected through the entire action of the hoods, as shown by the shaded portion *a b* between the full and dotted lines. The power of adaptability is, however, lost when the wheel is made much smaller, and with the same range of water-line as the larger one, which may be considered as the condition of the wheel when employed as an inner wheel for abstracting, as shown by fig. 2, an elevation, and fig. 3, a plan dealing with one chamber only. The letters of reference

are the same as fig. 1. Fig. 4 gives the wheel in another position—that of the hood A just closing the chamber *Z*. Fig. 5 is a plan looking down upon the chamber *Z* and inlet hood A, the outlet B in fig. 4 not being shown. Taking the water-line at its highest as the chord of the arc of the abstracting chamber, it will be seen that the segmental chamber in *Z*, under the conditions now set forth, can only abstract half the volume of the capacity of the abstracting chamber. Fig. 2 then may be considered as water logged, and fig. 4 gas bound. The elasticity of the

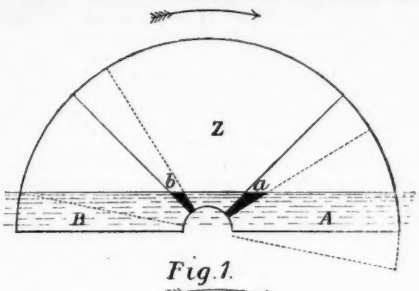


Fig. 1.

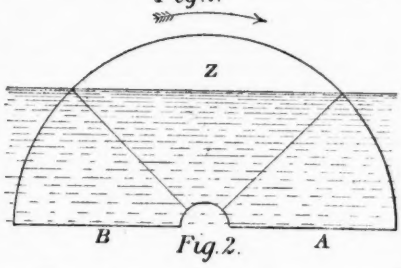


Fig. 2.

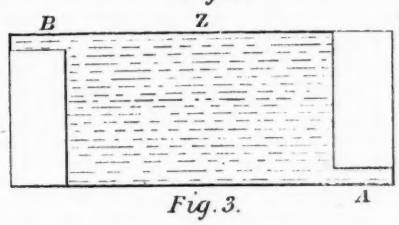


Fig. 3.

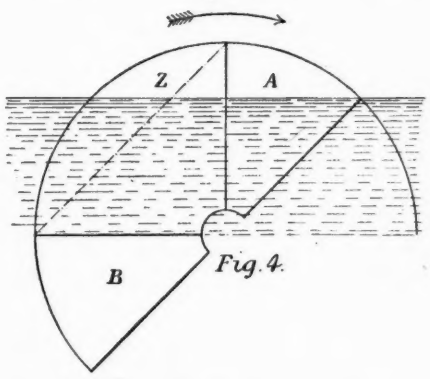


Fig. 4.

Fig. 5.

gas and mobility of the water have such freedom of action that, for all practical purposes, these prejudicial influences in this form of meter have not had to be dealt with by special means for relief which had to be done in one of the modified forms already referred to. This device is as unsatisfactory as the chamber is imperfect, and quite inapplicable to the chambers of the "inner wheel." As it is impossible to lower the lowest water-line of the meter, a larger wheel must be employed, though this will not remove the prejudicial action arising from the almost entire submersion of the inner wheel, nor give that play in motion as is shown in fig. 1. Nor can the whole volume of the chamber *Z*, be taken in unless the hoods have full freedom of action till the entire segment is above the water.

A perspective view, fig. 6, of one chamber of a wheel reveals the complicated construction of that which is so often spoken of as the admirable simplicity of the meter wheel, as it undoubtedly is in action. The chamber *Z* is formed by a fourth of the cylinder Y, the partitions X X, and the quarters W. The passages or hoods (the inlet and outlet) of the chamber are at A and B; and the passage of the gas through them and the chamber is indicated by the course of the arrow.

The patentees, in dealing with the form of chamber in their specifications, illustrate the subject by instancing a plain cylinder, with hollow cover and spout, being made to revolve under the ordinary condition of a wheel in action, as not affecting by such action the enclosed volume of gas nor of being affected by it. Further, the capacity of the chamber above the water-line could be increased or lessened by the change of water-line, without affecting the movement of the cylinder; nor would the water itself be affected by such action. The same applies to a segment of a cylinder, but with a limited action. In this, there is to be found the true form of abstracting chamber—a means of taking the volume for compensation without the operation disturbing the action of the meter; the volume being taken in, held, and then delivered without change in its condition.

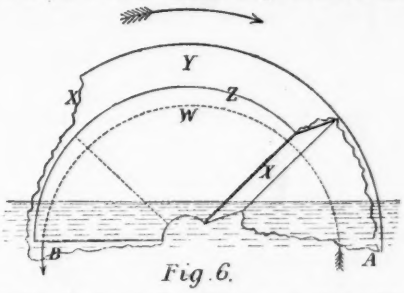


Fig. 6.

By returning to fig. 6, it will be seen that, although the chamber *Z* is but a quarter of a cylinder, the gas extends from inlet to outlet, A to B, over the half circle. The inlet passage closes by entering the water at one end; then by a continuance of the action, the hoods pass through the whole range of water-line; and the outlet hood rises from the water, and delivers the volume abstracted by the quarter chamber. And as, when used as an abstracting wheel the two passages may be connected to adjoining chambers (the two others than those through which the half circle extends), the inlet of the abstracting chamber would then take its supply from an emptying chamber, and discharge the gas into the adjoining chamber when filling.

Bearing in mind what has been said as to the fallacy of the opinion held, that it was necessary to deal with each chamber of the wheel in compensating arrangements of this description, we see clearly in fig. 6 the suggestive form of a new and simpler chamber. Although the chamber *Z* is but a quarter of a cylinder, the gas extends from A to B (inlet to outlet) over the half cylinder. The ordinary wheel must have more than two chambers, into which the cylinder has to be divided; and as the hoods simply secure gas-ways to and from each chamber, these have to be partly overlapped by the passages of communication. By enlarging the chambers, and reducing the number to two, each abstracting chamber is brought into direct communication with the chambers of the wheel proper; thus dispensing with partitions and hoods. By this alteration, it will be seen that the defects shown by figs. 2, 3, 4 and 5 are removed; and that the abstracting segment of the cylinder above the water will, under every condition of the water-line, abstract its full volume. In this segmental chamber there is not only a much more simple structure but a chamber with a uniform cross sectional area through its whole action, varying only for necessary work of abstraction by change of water-line.

By the employment of two such segmental chambers within the wheel, the "active" and "passive" principles of the patentees are preserved—the "active," the abstracting power of the chamber; the "passive," the change of a portion of the wheel proper into an unvarying annulus.

The several objects of the inventions thus dealt with are: The employment of a reduced number of chambers in a wheel for abstracting; the form of chamber, of unvarying capacity other than that through the alteration of water-line; a greater simplicity of construction with enlarged water-ways. We have now only to deal with the combinations of these segmental chambers. These, however, are fully set forth in the specifications; and those who are interested in the subject will doubtless follow the invention through its various phases. We will therefore confine ourselves to the most striking features in the development of the improved meter. The simple segmental chambers are separately arranged in various ways within a wheel. They are also combined, forming a separate wheel, and thus employed as an inner wheel. One of the most interesting is that shown by fig. 7. The two chambers *Z* and Z^1 are made entirely separated where they cross each other by being joined together as shown by Y Y^1 at A and B; and they are thus fixed within the wheel proper with their inlets and outlets A and B soldered to, and passing through, the partitions to their respective chambers. The direction of motion is shown by the full-line arrow; and the course of the gas, by the dotted arrow. In the crossing of the chambers, as shown, they assume a spiral form, it will be seen; and it is this development which makes the combination so interesting, leading up as it does to a spiral form of inner wheel—the form in which it is now constructed for general use.

Fig. 7 is made up of two segments joined as described; but fig. 8 is constructed as a spiral wheel. A cylinder M is formed; and two spirally shaped partitions are soldered in such a manner as to form a wheel with two chambers H H^1. The intake ends C C^1 are then made good to their respective chambers of the wheel—two in this case; the outlet ends F F^1 being left open to

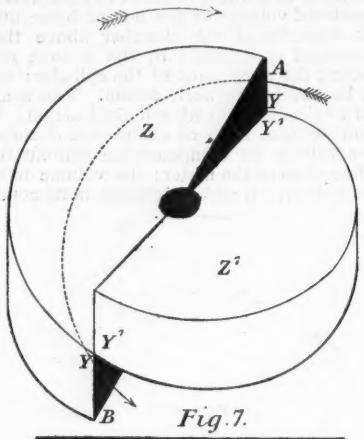


Fig. 7.

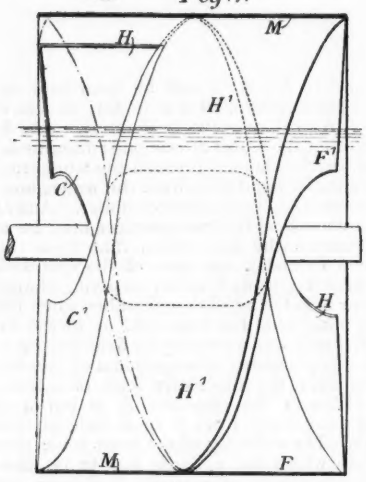


Fig. 8.

the hollow cover—forming an inner wheel, fixed in the usual way, partly within the wheel proper. The two spiral channels being connected to alternate chambers of the wheel from which when emptying they take their compensating volumes, and discharge the same through the other and open ends of the channel into the common inlet—the hollow cover.

The Vienna Municipality and the Imperial Continental Gas Association.—According to the Vienna Correspondent of the "Daily Chronicle," the Municipality of that city are continuing negotiations to acquire the works of the Imperial Continental Gas Association at the expiration of the present concession in 1899. He states that the Imperial Commissioner (Dr. Friebeiss) who is conducting the administration while the City Council is dissolved, was summoned last Thursday, by a unanimous vote of the Committee aiding him in the management, to apply to the Diet for permission to raise a loan of 30,000,000 fl., with which it is intended to purchase the existing works and erect new ones, as well as an electric lighting station.

The Dangers of Acetylene.—Particulars have just reached us from New Haven (Conn.) of a fatality which occurred there on the 21st ult., as the result of an explosion of acetylene gas. It appears that a scheme is on foot for supplying the city with this gas; and some experiments were being conducted with machinery in the workshop of Messrs. Pfleghar and Son, situated on the third floor of a building in Crown Street, adjoining the offices of the New Haven Gas Company. While two cylinders containing acetylene gas were being used for testing a new regulating governor, an explosion occurred which set fire to the premises, and caused the death of three men and injury to others. The actual cause of the explosion will never be known; for the man who was conducting the experiment was killed on the spot. The cylinders were some 4 feet long and 5 inches in diameter; and they had been tested up to 3700 lbs. per square inch—at all events, these figures were stamped on one of them, which was blown through the roof of the house, and fell on to the side walk of the street at a spot 250 feet from the place where the explosion occurred. The end of this cylinder was blown out; and the sides of the other (which remained in the building) were burst. The insurances on the building and the stocks of the various occupants amount to about £37,000.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Gaslight and Coke Company and the Portland Cement Trade.

Sir,—I attended the meeting of The Gaslight and Coke Company as a shareholder; and happening also to be Chairman of the Portland Cement Makers' Alliance, and a Director of John Bayley White and Brothers, cement manufacturers, I found myself obliged to enter a protest against the impression left with the meeting by that part of the Governor's speech which dealt with his Company's relations with the cement trade. It would, however, have been unsuitable for me to discuss the matter in detail on that occasion; and therefore I promised that a printed counter-statement should, if possible, be made as public as the Governor's words. Hence it is that I ask for the hospitality of your columns for the following remarks.

I must premise that gas coke is the chief, though not the only, fuel used for burning portland cement. Before the consolidation of the various Metropolitan Gas Companies into two great Companies—one on each bank of the Thames—competition among the coke producers adjusted its market price. Since that time, the price has practically been made as monopoly-prices generally are—by the fiat of the seller, who, occupying a position of great power, has used it to the full in other ways besides exacting the highest figure. Facilities formerly given as a matter of course, have been withdrawn; and, on the part of the largest Company—The Gaslight and Coke Company—a policy has been avowedly pursued of favouring small and discouraging large buyers, in order that, if anything should occur to detach these from their allegiance, the loss of their custom should be felt as little as possible.

I venture, however, to think that these disabilities have been borne with a fair amount of patience, and, though differences of view have at times become acute, some sort of *modus vivendi* has been arrived at; and the business done has reached large proportions. It would not surprise me if, of the 828,000 tons of coke sold by The Gaslight and Coke Company from the 1st of July, 1894, to the 30th of June, 1895, nearly half was supplied directly or indirectly to the cement trade.

It therefore required exceptional circumstances to bring an exceptional strain upon the relations between seller and buyers; and these have arisen in the following manner: So long as cement was sold at a fair figure, the makers, in resisting as best they could the high price that was at times imposed for coke, were, at all events, not absolutely fighting for dear life. But when, as may be seen from the Board of Trade returns invoked by the Governor on Friday last, the export price of cement fell more than 6s. per ton in three years, every 6d. per ton in the cost of coke became of vital importance to the cement trade. Accordingly, when it was announced, in the summer of 1894, by the Board of The Gaslight and Coke Company to their buyers (who had been paying for that year's supply 11s. per ton, and were confidently expecting a drop of 1s. for the following year) that a cement manufacturer had bought a quantity of coke at 13s. 6d., *which was an advance of 2s. 6d. per ton at a time when the price of cement was at the lowest it had ever touched*, and that that was the price—take it or leave it—at which others could buy, the intimation was received with something like dismay.

Your readers will ask: "Why, then, did you not refuse to buy?" The answer is very simple. The cement trade was not united; and the monopolist position of the Company enabled it to beat us in detail. The larger the buyer, the more he was at their mercy. And yet the Governor would have the shareholders believe that an alliance of the members of this important industry—supporting, as it does, many thousands of families on the Thames and Medway, having been since formed to watch the general interests of the trade, and, as I am in a position to state, with objects in which the purchase of commodities held a quite subordinate place—is to be classed with the rings that "corner" produce and stocks, and that, the moment it turns its attention to the defence of a vital position, it must at all costs be crushed. And by what means? He threatens to export the coke which he avers that he has, with a jealous care for our well-being, binned away for English cement makers, and fears lest it may fall into the kilns of our Continental rivals. Is he perchance recalling the days, not remote, when, to make us pay their price, his Company exported coke at a lower figure than they would take from us? And is it thus he hopes to tempt the foreign buyers who, rumour says, are not more ready than the English to pay 10s. a ton? Why, Sir, the very power he wields for the doing of these and kindred things is due to the small gas companies having been welded together into one giant concern; and without that fusion, he could never have been in a position to reply, as he did recently to a deputation of our trade: "You must not look upon these transactions as between an ordinary seller and his buyers. We are more like a Department of the State" (!)

As Mr. Livesey stated at the meeting on Friday, in a speech which I confess surprised me for its outspoken appreciation of the cement makers' position, the policy of exorbitant charge brought its Nemesis. Cement was being burnt with coal in place of coke. Buyers who had contracted for a portion only of their requirements bought the remainder at lower figures. Stocks of coke were increasing. Visions of congestion were before the eyes of managers. The South Metropolitan Gas Company recognized their mistake; and they voluntarily offered us a rebate of 10d. per ton. This, though an insufficient one, as Mr. Livesey himself said on Friday, was accepted as a graceful concession. The Gaslight and Coke Company refused to do the like; and when the time came last September that both Companies desired to make new contracts, we took account of considerate treatment, and did not refuse to pay the South Metropolitan Company the 10s. a ton they asked, high as we thought it, while in the case of The Gaslight and Coke Company, we responded to their request for tenders by a bid of 9s. 6d. To that we adhered as the highest figure warranted at that time, albeit we have since vainly endeavoured to meet them; offering to pay the extra 6d. they demanded if they would grant certain concessions in the terms. When these were refused, our offer was withdrawn.

We do not deny—we are glad to aver—that the recent tendency of our trade has been slightly upwards both in volume and price. It is indeed high time it should be. Nor do we dispute the fullest right of the seller to get the market price, nor the "needs must" for the buyer to pay it. What we do say is that the present and prospective congestion of stocks in London (180,000 tons of coke are held by The Gaslight and Coke Company alone) does not allow of 10s. being fairly called the market price. We feel that it is sought to enforce it unnaturally by means of a monopoly given for a very different purpose. If it is desired to make the public believe 10s. for coke to be warranted by the present price of cement, we point to the Board of Trade returns to show that it is not; and if it were, we add that the argument based on the co-relation of prices is one which hitherto the Gas Company have steadily refused to hear, because they thought it would not tell in their own favour. Moreover, this Company ls now selling to costermongers and other small buyers, at 7s. 6d., and has offered additional quantities to truck contractors, also relatively small buyers, at 8s.

But believe me, Sir, there is no hostility, no "boycott." Mr. Livesey pointed out how a little consideration and correction would have palliated our grievance, and brought us to terms months ago. The *non possumus* of the Governor has unfortunately had a different tendency. But though we have grave interests to defend, and must defend them, we shall not be slow to recognize and respond to a change of attitude when it comes. We are regular and willing buyers, wishing to do business on terms of equality, not with a masterful "Department of the State," but with willing sellers. When this can be, public animadversion on our trade will, we hope, cease to find a place in annual reports and in shareholders' meetings.

2, *Lime Street Square, E.C., Feb.* 10, 1896. FRED. A. WHITE.

SIR,—To prevent misunderstanding, which from Mr. Rokeby Price's observations at the Chartered meeting appears possible, will you allow me to say that I quite agree with that gentleman's remark that the price of an article must be fixed by the higgling of the market, and that a seller is perfectly justified in accepting an advance offered by the buyer? I am in accord with him on the question of the honest and honourable fulfilment of contracts. But I say that there are cases—very rare indeed, perhaps one in five hundred—where it is both unfair and unwise to exact the uttermost farthing; and, in my opinion, the London coke contracts of 1894-5 with the cement makers constituted such a case, when the price was raised by one of them, and, as afterwards appeared, in order to injure others.

The accepted laws of political economy govern, as a matter of course, the material conditions of buying and selling; but the relations of man with man are not entirely material. There is another important element, beyond my power of definition; and the only idea of my meaning I can give is by describing it as human nature. If you can admit to your serious pages anything in the shape of a story, I should like to give one that greatly impressed me in early life, as an illustration: William Penn, the Quaker founder of Pennsylvania, agreed with a tribe of Indians the price to be paid for as much land as a white man could walk round in a day. He walked 84 miles, to the surprise and disappointment of the Indians. Penn, observing this, inquired the reason. They replied: "White man make big walk." "How much more money do you want?" asked he. They told him. He gave it, and henceforth they were his firm friends, as were all other Indians with that great man.

Had the chairman of a modern commercial company been in Penn's place, not possessing his just and magnanimous spirit, but actuated by the common commercial spirit, he would have told the Indians that they had agreed to the terms, and must abide by them; that it was a pure matter of business; that, had it been the other way, they would not have given up part of the price (*even this is done sometimes*); that he was a trustee; that a contract is a contract, &c. Or, if the Indians had been very pressing, they would probably have been told that a concession would be made; that the agreement would be cancelled on condition they they would make a new one to sell as much land as two men could walk round in a day, for which a higher price—possibly 50 per cent. more—would be given.

Here comes in that potent element, human nature. Penn, after all, paid no more—probably even less—than the full and fair value of the larger area. But in the purchase was included something infinitely more valuable than the land—the friendship and good-will of the tribe. On the other hand, by the opposite course, the buyers would also have had something more than the land, but something that, under easily conceivable circumstances might render the land worthless—viz., the absence of friendship, and probably the ill-will of the tribe, who would certainly take care not to be "done" a second time. White men and Red Indians are much alike.

Beyond and superior to, and tempering, the laws of political economy, stands that grandest business maxim, the Golden Rule, and that other like unto it: "Give and it shall be given unto you. . . . For, with what measure ye mete withal, it shall be measured to you again."

Reigate, Feb. 8, 1896. GEORGE LIVESEY.

Relative Values of Crude Naphtha and Benzol.

SIR,—I am surprised that your correspondent, Mr. Henry Simon, should persist in his illogical deductions.

In case any of your readers should continue to be misled by them, may I be allowed to point out that, as average 30 per cent. crude naphtha contains at most 25 per cent. of nineties benzol, it requires *cæteris paribus* 4d. per gallon rise in benzol, to add 1d. per gallon to the price of crude naphtha. If Mr. Henry Simon will work out the relative values of 90 per cent. benzol and crude naphtha on this basis, he will find that—taking his own figures of 10d. and 2s. 4d.—the price of crude naphtha is higher than the relative value of benzol warrants.

With regard to the question of profit, to which he gives such prominence, as a refiner of considerable experience, I should be very glad to realize even 1d. per gallon profit; but unfortunately the refining of naphtha is a lean, if not actually unprofitable, business.

It is not necessary, however, to have a knowledge of crude naphtha refining to see the obvious fallacy in Mr. Simon's arguments—so obvious, indeed, that it is difficult to believe that he is quite so unsophisticated as would appear from his letters.

Sculcoates, Hull, Feb. 8, 1896. J. L. MAJOR.

Retort Coke-Ovens.

SIR,—The articles which appeared recently in the "JOURNAL" upon this subject, seem to put those who still have great faith in the excellence and value of the old beehive oven somewhat on their defence, and afford them an opportunity for giving a reason for the faith which is in them.

When the writer of the articles says: "The metallurgical coke industry is in course of being profoundly modified in the direction so well exemplified at Lanchester," he is I think going a good deal farther than the facts yet warrant. We have to remember that the beehive has withstood the competition of the retort-oven for well nigh thirty years. When its virtues and values were brought under the notice of the Iron and Steel Institute in 1880, some results of their working were given dating back to 1867; and notwithstanding that a profit of 10s. per ton of coal was, by advertisement, attributed to them, the beehive still holds its own—in England, at all events. As for the Continent, Germany, France, and Belgium—if, after 40 years, I am any judge—do not know what really good coke is. "Where ignorance is bliss 'tis folly to be wise."

Now the position of the beehive is this: They manufacture a coke of perfect quality, which amounts to 66 per cent. of the coals used, and contains less than 1 per cent. of moisture. The coke after being slaked in the oven, is allowed 10 to 15 minutes to dry, before being drawn; so that during the last two years, at two of the largest coke-yards, the average moisture of all the coke made, taken fortnightly at the iron-works, has been 0·55 per cent. This is really a very important matter, because moisture not only causes the purchaser of the coke to pay for its weight, but when it gets into the iron furnace, good coke is wasted in expelling it. For this reason alone, a large firm in Durham abandoned some years ago, a lot of ovens of the retort class (Belgian, I think) in which, and in the ram for expelling, they had invested a lot of money. Speaking at the Northern Mining Institute in 1873, a member of the firm said: "With every care taken in watering coke outside, it was unfit for blast-furnace purposes, owing to the high percentage of water it retained."

You see when coke is cooled outside, so long as the manager is looking on, a workman is careful; but these men come to work on wet stormy mornings at 3 a.m. in winter, and pour on the water so as to get the work done as fast as possible, with a result which, in practice, proves ruinous. When once too much water is poured on, there is no means of expelling it again, as when watering inside a hot oven.

As to colour and form. These so-called refinements of the produce of beehive ovens are not, as the writer referred to fancies, "a mere matter of taste." The greater heat of the internal self-generated heat, has a most important effect. It is the true source of "the silvery lustre," which is not, as he supposes, caused by quenching the coke inside, but is the redeposited carbon of the hydrocarbons, which have been vaporized, and forms an outside casing similar to the enamel of the teeth. It has I believe much value in resisting the reducing effects of the gases in the blast-furnace; and it is at the same time, an outward and visible sign of the quality of the coke within. If a coke-oven from any cause—such as dirty coal, or an ill-judged supply of air—fails during burning to reach what I may call the critical temperature, when drawn, we get the soft, dead, lumpy coke of the retort, followed by immediate complaints from the iron-works. Or if an oven is drawn as soon as the gases are burnt off, the same result follows. Therefore, the beehive ovens are loaded so that they may stand 12 hours, and often 24, hardening and brightening, with all possible access of air shut off. I have been trying to get the same treatment applied to retort-ovens, where it would no doubt have good effect; but then away would go much of the high yield, and loss of bye-products within a given period. That such a hardening period is necessary in the case of retort-ovens may be plainly seen from a very cursory examination of the interior of the charge of coke when delivered upon the bench.

The writer of the articles seems to be under the impression that there are no beehive bye-products; but I claim that there are, and very valuable ones too. At one colliery, 600 feet deep, there were drawn last year 1064 tons of coal and 3200 tons of water each 24 hours, besides which steam was supplied for hauling engines, fans, coal crushing, and cleaning belts; and yet not a ton of coal was used for boiler purposes—the whole of the heat being obtained from the coke-ovens.

Let us look at this work a little farther. Twenty-five ovens heat one Lancashire boiler 30 ft. by 8 ft., which evaporates 76 tons of water in 24 hours. This, at 17 lbs. of steam, is equal to 417-horse power, or if we take the coal as capable of evaporating 7½ lbs., and worth 7s., the work done is equal to £3 10s. per day. Then as these ovens coke 34 tons of coal each 24 hours, the saving amounts to 2s. per ton of coal.

We learn that the boilers at Lanchester are heated by the gas of the retort-stacks. No doubt; but what does their work amount to? That is what I want to find out.

If you will turn to the "Proceedings" of the Iron and Steel Institute for 1880 (Vol. I., p. 145), it is stated that each oven carbonizing 3080 lbs. of coal per 24 hours gives about 3⅓-horse power; whereas the beehive, as I show above, with 3073 lbs. of coal, gives nearly 17-horse power, or 4·64 times as much.

Now just a few words as to the retort bye-products. When I first wrote upon the coke question, 36 years ago, sulphate was worth £13 per ton. Since then, it has gone steadily down; the last quotation being £8 10s. In your report recently ("JOURNAL" for Jan. 7, p. 35), we read: "Prices now approximate closely to what threatens to be vanishing point." This does not offer much inducement to us to spend £155 per oven, instead of £60. With respect to yield, it is said: "The yield of coke from the Simon-Carvés retort is so much greater, however, from the same coal—76 per cent. and upwards, as compared with 65 per cent. or thereabouts with the beehive." The last analysis of

coal I am using, tested at the laboratory of the Clarence Iron-Works, and dated April 25, 1895, is—

	Bustey Seam.		Brockwell Seam.
Fixed carbon	63·39	..	65·48
Ash	6·47	..	4·07
Coke	69·86	..	69·55

Another analysis of coal from the same colliery by Mr. John Pattinson, F.C.S., gives: Fixed carbon, 68·74; ash, 2·64 = 71·38; and over the whole of last year, the coke of first-class quality put into trucks is equal to 66 per cent. of the coal used. How am I to get 76 per cent.? unless I draw the ovens before the coal is fully carbonized, and take credit for an excess of water.

You will now, I hope, see that the metallurgist who makes his own coke, and is determined to have it above suspicion, has something more solid than a "fancy for appearances" when he hesitates about adopting an expensive plant, and prefers to hold by that which he knows is good—and to spending a lot of money, for which from present prospects he may fail to get two sixpences for a shilling.

A. L. Steavenson.

Durham, Feb. 1, 1896.

The Purifier Fatality at North Shields.

Sir,—Sincerely sympathizing with all those concerned in the recent lamentable occurrence at North Shields, I have waited until now, after the inquiry held yesterday as to the cause of the death of the five men through an accident in the working of a sulphate of ammonia apparatus, before passing any comments thereon. I cannot endorse the concluding sentence of the editorial note in your issue of the 28th ult.: "Sympathy is due in this terrible visitation from all those who, being engaged in the same industry, are exposed to the risk of being plunged at any moment into similar trouble." Nor can I agree with the recommendation of the jury at the inquest, to provide respirators for the men, and take measures to improve the entry and exit of the pit. Respirators are certainly most valuable things when handy, in case the accident has happened; and they will probably be the means of preserving the lives of the rescuers. But they will be practically valueless and most troublesome to the men emptying a purifier. As to improving the pit, it should certainly be closed up altogether, and a proper appliance erected above ground.

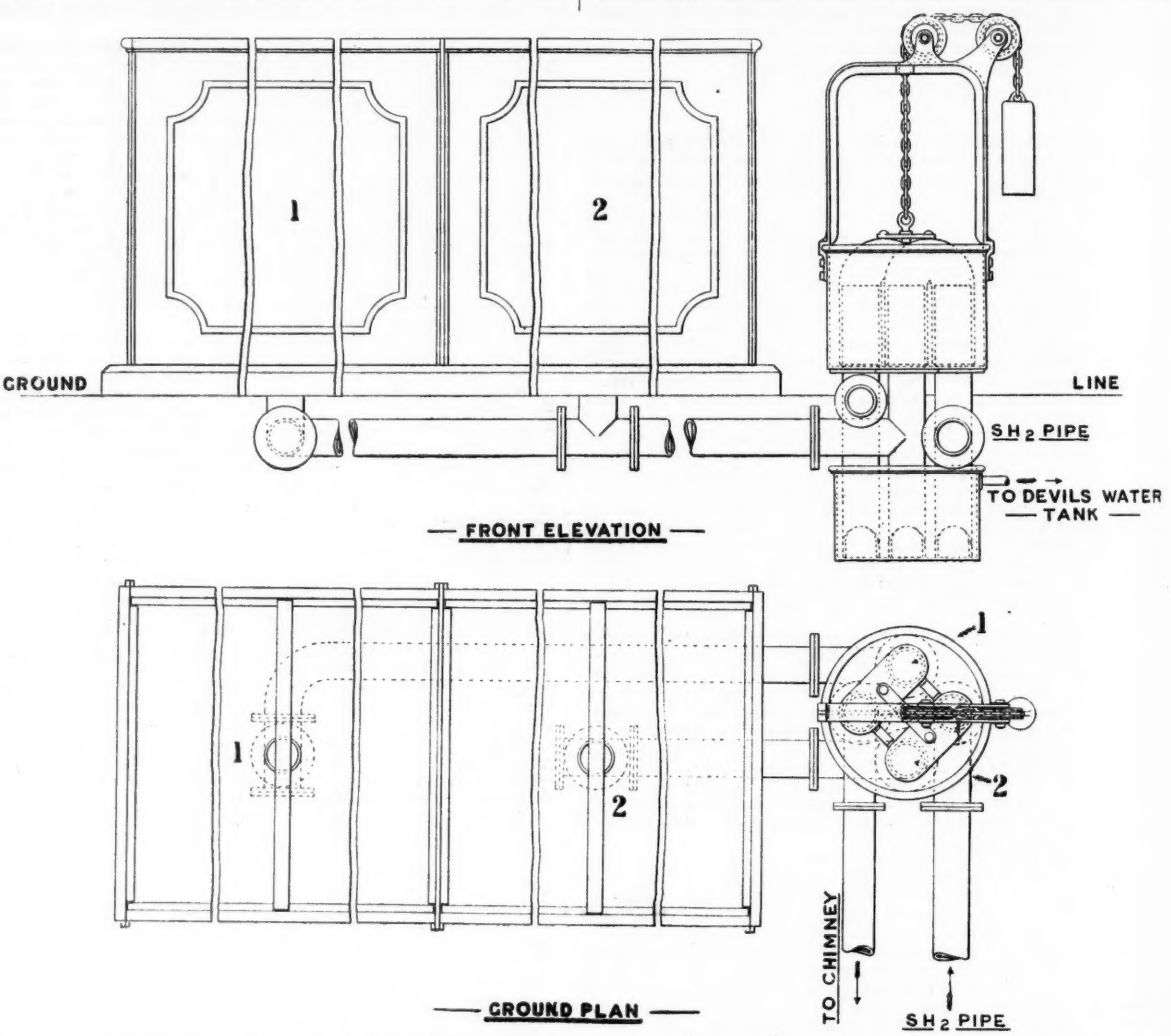
I send herewith a drawing showing an apparatus I have devised; and I shall be glad if you will reproduce it for the benefit of those sulphate makers who are using purifiers, and also of my numerous competitors who are not acquainted with the apparatus.

I invariably employ two purifiers. The sulphuretted hydrogen gas-pipes leading into these purifiers are in communication with a specially designed change-valve on the one side, and on the other they are connected respectively to the condenser and a branch leading into the boiler chimney. (I may add parenthetically that there is no possibility of the condenser being directly connected to the chimney, as the construction of the valve does not admit this.) When working, the sulphuretted hydrogen gas passes from the condenser through the valve into one of the purifiers, while the second purifier is involuntarily connected to the chimney. While the oxide in one of the purifiers is being impregnated with sulphuretted hydrogen gas, the other is revivified *in situ*. By frequently changing the valve, the action or process is reversed alternately. I have found I can run purifiers from three to five months without changing the oxide. Should the operation become necessary, the purifier to be emptied is connected for a few hours with the chimney, which will render it perfectly sweet as to smell. Furthermore, as the men throw out the oxide, they lessen the thickness of the layer; and consequently the down-draught of fresh air is increased with every spadeful of oxide taken out—in fact, the fresh air is drawn on to the men working in the purifier. The changing of the valve occupies less than half a minute, and is completely reliable; consequently, no mistakes, fatal or otherwise, can happen. I may mention that if the boiler chimney is too far removed from the sulphate plant, the same results may be obtained by substituting an air-pump; only in this case there is the expense of steam for working it.

I should be pleased if the valve above referred to were to be generally adopted; thus putting all danger out of question. I know the Chief Inspector under the Alkali Act is acquainted with it. I hope he will forgive me for alluding to him without his permission; but I am convinced he would be the first to recommend it, if his position did not prevent him from doing so.

Maurice Schwab.

Manchester, Feb. 5, 1896.



Proposed Installation of Inclined Retorts at Barry.—On the occasion of a recent inspection of the gas-works by a Committee of the Barry Dock District Council, the Engineer (Mr. F. M. Harris) informed the members that during the winter the whole of the retorts had been in operation; and, taking into account the fact that applications for a supply had been received from 50 additional consumers in the past month, it would be necessary to increase the number of retorts before next winter, as the manufacturing power of 40 million cubic feet annually had already been attained. In view of the saving in labour and space, Mr. Harris recommended that an installation of inclined retorts, with coal-elevators and other necessary plant, should be adopted, at an approximate cost of £4000. This, when completed, would allow of the production of double the present quantity of gas. The Committee subsequently resolved that the preparation of plans and specifications should be at once proceeded with.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, Feb. 7.

(*Before Mr. Justice* NORTH, *for Mr. Justice* CHITTY.)

The Meteor Incandescent Lighting Company, Limited, v. The Incandescent Gas-Light Company, Limited.

This was a motion for an injunction to prevent the defendants from publishing threats against the plaintiffs and their customers thereby entirely preventing the plaintiffs from carrying on business.

Mr. BOUSFIELD, Q.C., said defendants had commenced an action for infringement against the plaintiffs, so that he could not move under the 32nd section of the Act. But he submitted that the threats were not made *bonâ fide;* and he was therefore entitled to an injunction to restrain them. They were originally issued without the slightest knowledge of what the Meteor Company were doing or were about to do; but they claimed to be the owners of a master patent which entitled them to stop anyone making or selling anything in the nature of an incandescent gas-light. This they had no right to do, because Mr. Justice Wright had, in another motion moved by them against the Sunlight Company for injunction, held in substance that their patent was for the particular materials used in forming the mantles, and refused the injunction, which judgment had not been appealed from. There was evidence on the part of the present plaintiffs that the materials in their mantles were not the same as those mentioned in the defendants' specification; and there was no evidence whatever against it. After going somewhat further into the details of the matter,

Mr. TERRELL, Q.C., who appeared for the defendants, informed his Lordship that two actions by the defendant Company for infringement of their patent were fixed to be heard on the 10th inst.

Justice NORTH thereupon directed that the present motion should stand over until those actions had been tried; but there would be liberty to apply again if unforeseen delay should occur in the trial.

(*Before Mr. Justice* NORTH.)

Newcastle and Gateshead Water-Works Company v. Pawson's Trustees.

Mr. SWINFEN EADY, Q.C. (with him Mr. METHOLD), moved that an award, dated Nov. 28, 1895, made by Sir Jacob Wilson, be set aside so far as it determined that the Water Company should pay to the Pawson Trustees the sum of £8152 18s. as compensation for being required compulsorily to sell to the Company the Ramshope and Whitelea Estates, or that the award should be sent back for reconsideration, on the grounds: First, that the Trustees were not, under the Company's Act of 1894 or otherwise, required compulsorily to sell their land; secondly, that the Umpire had no power to award, and ought not to have awarded, compensation for compulsory purchase.

Mr. BALFOUR BROWNE, Q.C., and Mr. BOYD appeared for the respondents.

The facts may be shortly stated as follows: The Water Company in 1894 obtained an Act of Parliament with the usual powers for taking land, including 60 acres held by the Trustees. They, on the other hand, had a clause inserted conferring upon them power to give notice to the Company within two years to purchase the whole estate—being upwards of 5000 acres. The Company had not, down to the present time, given the Trustees notice to treat for any of their land; but on Dec. 31, 1894, the Trustees sent a written notice, under section 19 of the Act, requiring the Company to take the whole estate. They, however, added a note to the effect that if the Company determined not to take any part of the land, and would give them a written assurance to this effect, they would apply to the Court of Chancery, in which their estate was administered, for leave to withdraw the notice. The Company not having given such assurance, Arbitrators were appointed, and an Umpire (Sir J. Wilson), who had awarded that the Company should pay to the Trustees the sum of £40,139 as purchase-money for their interest, and £8153 as compensation for being required to sell the land compulsorily. It was this latter amount that the plaintiffs objected to.

At an early period of the argument,

Justice NORTH expressed an opinion that the proper way to try this question was by action to enforce the award, and not by motion.

Mr. BALFOUR BROWNE, however, said all parties were desirous of having the question settled in the most speedy and economical way.

Mr. EADY then proceeded with his argument; but it soon appeared that, while Mr. Balfour Browne was under the impression that the one question to be decided was whether, under the circumstances, the Trustees were required to sell compulsorily, his learned friend desired to raise the further and broader question whether, even assuming it was a compulsory purchase, the Umpire had power to award compensation beyond the value of the land taken.

Justice NORTH said he should have been willing to decide on the motion the first question, which simply depended on the construction of the Act; but he declined to decide the broader issue.

The motion therefore stood over for the Trustees to bring an action; costs being reserved, both parties undertaking to facilitate the trial.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, Jan. 28.

(*Before Mr. Justice* MATHEW.)

St. Olave's Board of Works v. Southwark and Vauxhall Water Company—The Liability for Damage Caused by Frost.

The point to be decided in this case was whether the defendants or the plaintiffs should pay for damage caused to the roadway of Church Row, Southwark, by the bursting of a pipe belonging to the former. The Water Company said that the pipe burst in consequence of the frost, and not by reason of any negligence on their part; moreover, that, under their statutory powers, they were entitled to have the pipes beneath the roadway. On the other hand, the plaintiffs contended that the pipe burst by reason of the defendants not attending to it, and not because of the frost.

Mr. BIGHAM, Q.C., and Mr. C. GLENN appeared for the plaintiffs; Mr. CRIPPS, Q.C., and Mr. GORE BROWN represented defendants.

Mr. BIGHAM having stated the plaintiffs' case, as above set forth,

Mr. CRIPPS said there was another point—whether the damage to the road was caused by the stretching of the wood pavement. The wood pavement was laid down without expansion-joints, which would have prevented the stretching of the pavement.

Mr. BIGHAM said that was the first he had ever heard of any such suggestion.

Mr. *G. W. Thompson*, Surveyor of the St. Olave's District Board of Works, said the street in question was paved for nearly the whole of its length with creosoted wood blocks. In December, 1894, the pavement was relaid; and some of the original blocks were used again. He had never heard it suggested that the damage to the road was caused by the breaking of the pipe due to the want of expansion-joints in the pavement. As a fact, there were ¾-inch expansion-joints between the wood paving and the kerb, and ½-inch joints between the blocks. On Feb. 15, he found the road had been blocked by the police as being dangerous. The road had lifted considerably above the level; and at No. 2 plug, the blocks had been raised about 2 inches above the level of the plug. There was clear indication of water having come up through the roadway. In the channels of the street on both sides, there was ice 3 inches thick; and the sand upon which the blocks were bedded when the road was laid had been washed up between the plug and wood paving. The shoe which held the plug in position was displaced by the plug being unskilfully lifted up by the turncock; and this had caused the water to escape under the road, instead of on the top. It had cost £105 to repair the damage to the road.

Mr. *Macgregor*, Manager of the Improved Wood Paving Company, said the provision made for expansion was as usual. His attention was called to Church Row on Feb. 16. The paving was lifted up from the concrete; and the box or shoe at the plug was slightly tilted over. His impression was that the frost and the pressure of the water from the main had brought about the tilting of the box and the escape of water from the plug. In his opinion, the real cause of the escape of the water was the effect of the frost on the wooden plug, which might make it slip out of the socket.

Mr. Justice MATHEW: How would the frost affect the plug?

Witness: It would make the plug expand, and cause it to rise up.

Mr. BIGHAM: To what fault of the Water Company do you attribute this accident?

Witness: I do not think it was the fault of the Water Company.

Was it anybody's fault?—I should not like to say so.

Mr. BIGHAM, after consulting with his junior, said that, in view of the evidence which had just been given by the witness, he could not keep up the case so far as negligence was concerned.

Mr. Justice MATHEW asked what other question remained.

Mr. BIGHAM said the point then arose whether the Company were liable under the statute, negligence or no negligence.

Mr. Justice MATHEW said he had had that question threshed out in the case arising out of the bursting of a water-main at Putney.

Mr. GLENN contended that the Company were liable, irrespective of the question of negligence, under section 112 of the Metropolis Management Act, 1855, which provided that, in the case of any part of the pavement of any street being sunk, broken, injured, or damaged by reason of the breaking or bursting of any pipe belonging to any Gas or Water Company, it should be lawful for the vestry board of the parish in which the pipe was situate, if they deemed it expedient so to do, to cause notice to be given to the Company to which the pipe belonged to forthwith make good the pavement; and if the Company did not, within 48 hours after receipt of the notice, carry out the necessary repairs, then certain penalties were imposed.

Mr. CRIPPS observed that no such notice as provided by section 112 had been given. The Vestry had repaired the road themselves, under the assumption that the Water Company had been negligent, and were therefore liable for the damage.

Mr. Justice MATHEW, in giving judgment, said he had no doubt that the action was brought with the expectation on the part of plaintiffs that they would be able to establish negligence of the defendants, and that therefore the plaintiffs were entitled to recover; but upon that question of fact, the plaintiffs had been compelled to abandon their supposed cause of action. Under those circumstances, the plaintiffs could only have such right as might arise upon the assumption that there had been no negligence or default on the part of the defendants. It was not disputed that the defendants possessed the statutory power that enabled them to place the main in question under the road, or that the damage that had been done was to be attributed to the escape of water from that main. In this position of things, although the original cause of action had disappeared, it was asserted on the part of the plaintiffs that they were entitled to recover from the defendants the expenses of repairing the roadway. Against that contention, it was insisted by the defendants—there being no negligence or default on their part—that there was not, under the circumstances, any right of action against them, and that any remedy in respect of damage to the roadway was one which must be assumed in accordance with the statutes applicable to such a case. His Lordship then referred to section 112 of 18 and 19 Vict., cap. 120, which provided that the Vestry should give notice to the Water Company of any damage being done to the road by their pipes, and said that this appeared to be the exclusive mode of proceeding open to the plaintiffs; but unfortunately for them they had not given the required notice. Whether the plaintiffs had any remedy against the defendants now, it was no business of the Court to say. The action failed, and would be dismissed with costs.

Gas and Water Companies' Rating Appeals.

At the Sessions House, Clerkenwell, last Saturday, the first meeting of the Court of Quarter Sessions was held for the hearing of appeals against the sixth quinquennial valuation lists prepared under the Valuation (Metropolis) Act, 1869. Mr. Loveland-Loveland, Q.C.,

presided over a Bench of Magistrates which included Sir Harry Poland, Q.C. Among the Companies who have cases set down for hearing are The Gaslight and Coke Company, the South Metropolitan Gas Company, the Wandsworth and Putney Gas Company, the Chelsea Water Company, the East London Water Company, the Grand Junction Water Company, the New River Company, the Southwark and Vauxhall Water Company, and the West Middlesex Water Company. Mr. Loveland-Loveland informed the Court that Sir Peter Edlin, the learned Chairman, was obliged, acting on medical advice, to absent himself; and that therefore all cases involving questions of law, and all appeals by gas, water, and other companies, would stand over for the present. Early in March, a further announcement as to the course of business would be made. In the appeal of The Gaslight and Coke Company against their assessments in repect of mains, pipes, &c., in the parishes of St. Anne and St. James, Westminster, application was made and granted that the appeal should be struck out with costs; terms having been agreed to. The same course was followed in regard to the other appeals of the same Company as to their assessments for mains and pipes in the parish of St. Mary, Islington; for land, mains, pipes, &c., at the Nine Elms Gas-Works, in the parish of St. Mary, Battersea; and for the offices, Nos. 82 and 84, Horseferry Road, land, gasholders, and buildings in the rear thereof, land and gasholders in Monk Street, Causton Street, and Page Street, and mains, pipes, &c., all within the parishes of St. Mary and St. John, Westminster. Mr. Bayle, in reference to the appeal of the Grand Junction Water Company against their rating for mains, pipes, &c., in St. Mary's, Paddington, moved for leave to serve notice to strike out paragraph 10 of the particulars supplied in the case. In the paragraph, there were certain figures which were incorrect. He would undertake to supply correct figures within ten days. In reply to the Chairman, it was stated that this was one of the cases which Sir Peter Edlin would take. Mr. Danckwerts opposed the motion; and the Chairman directed it to stand over—adding that, it being known that the figures were wrong, the object of the application would be met.

Water Supply in Times of Frost.

At the Chertsey County Court, last Thursday, Mr. W. A. Bilney, solicitor, of Temple Chambers, Temple Avenue, E.C., was sued by the West Surrey Water Company for the sum of 15s. for "goods sold and delivered." Defendant resides at Weybridge; and the claim was for the water-rent of £3 15s. The defendant had paid £3; but he deducted 15s., on the ground that, during the frost in the winter of 1894-5, the Company's mains were frozen, and no water was supplied. Mr. Batten appeared for the Company; Mr. Corrie Grant represented the defendant. The hearing of the case occupied four hours. At the commencement, the claim was amended by striking out the words "goods sold and delivered." Mr. Corrie Grant then admitted the claim, on condition that he should be allowed to proceed with a counter-claim for 30s., compensation for an insufficient supply of water for domestic purposes from Feb. 2 to April 7, 1895. The counter-claim was gone into; evidence being called to show that the Company had not laid their mains at a sufficient depth to prevent the water from being frozen. Mr. J. S. Crawshaw, the Surveyor to the Weybridge District Council, stated that he had never known water-mains to be laid at such a short distance below the surface of the ground as they were at Weybridge. The main outside defendant's residence was only 18 inches beneath the surface of the road. For the defence, Mr. Batten contended that, as the Act provided for a penalty of 40s. a day if the Company did not furnish a sufficient supply of water, there was no right of action in any Civil Court. The Judge adopted this view, and also held that there had been no proof of negligence on the part of the Company. He therefore gave judgment for them, on the claim, and against Mr. Bilney on the counter-claim, with costs on B scale. Mr. Corrie Grant intimated that the case would be taken to the Divisional Court.

Trial of Incandescent Gas Lighting in Dublin.—The Dublin Corporation are experimenting with incandescent gas lights for the public thoroughfares of the city; and already Harcourt Street is illuminated by them. According to a local paper, the effect produced is very satisfactory.

The Okehampton Corporation and the Gas Company.—The dispute between the Okehampton Corporation and the Gas Company as to the ownership of a piece of land, to which reference was made in the "JOURNAL" for the 21st ult. (p. 139) was the subject of considerable discussion at a meeting of the Town Council yesterday week. The matter came up in the report of the General Purposes Committee, who recommended the appointment of a Committee to inquire into the ownership of the waste land on the south side of the gas-works. Alderman R. Passmore suggested that, if this were adopted as it stood, it would be a tacit admission that anyone had a right to take a piece of public roadway without the authority of the Council. He understood that a portion of the road had been enclosed by the Company. The Mayor (Mr. S. P. B. Newcombe) said he would not advise anything; but if a Committee were appointed, he would try to put things right. In answer to questions by other members, his Worship added that he believed someone had a right-of-way over land at the place, and that the road had never been closed against the public, though, so far as he knew, the Corporation had never repaired it. After some remarks by members, Alderman Jessop complained that comments made upon the Company were unfair and untruthful. The greater part of the land enclosed was the Company's property; and they had no desire to take that which was not their own. If, however, they had done wrong, they were willing to make restitution. The remainder of the land thrown into the roadway was purchased, as they believed, from the person who owned it. A Committee was appointed to make further inquiries, and meet the Directors of the Company.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

Proceedings at the Half-Yearly Meeting.

The Half-Yearly Ordinary General Meeting of the Company was held last Friday, at the Chief Office, Horseferry Road, Westminster—Colonel W. T. MAKINS (the Governor) in the chair.

The SECRETARY and GENERAL MANAGER (Mr. J. W. Field) read the notice calling the meeting; and the report of the Directors, given in the "JOURNAL" last week, was taken as read.

The GOVERNOR, in moving the adoption of the report, said the key-note and dominant factor of the Company's history for the past half year was expansion and progress, he might say, all along the line. They had made and sold more gas, laid more mains, fixed more meters, supplied more public lighting, more gas-engines—in fact, in every branch of their business, there had been progress. This was not a mere statement, but was completely supported by the figures he intended to lay before them. After a period of three years, during which there had been a continual decrease in the Company's business, the quantity of gas sold during 1895, as compared with the quantity sold in 1894, showed an increase of 5·77 per cent. The figures of their sales (which were record figures, being the largest they had ever had) amounted in 1895 to 19,294,801,000 cubic feet, or an increase over the figures of 1894 of 1,052,452,000 cubic feet. This was a difficult figure, perhaps, for the proprietors to imagine; but he might explain what it meant by telling them that this increase alone for the year 1895 would have been sufficient to light Brighton, Oldham, or Salford for the entire year. The past half year was quite a normal one in point of weather; but it gave them an increase of 4·86 per cent., of which 2·58 per cent. was due to what might be termed their old customers; while no less than 2·28 per cent. of the increase was attributable to the new class of consumers who took their gas on the prepayment meter system. It was also very satisfactory to be able to report that the use of gas for the purposes of public lighting in their district was increasing, in spite of the competition of the electric light. For the ten years from 1885 to 1895, the increased consumption as regarded public lighting was 21 per cent. compared with 17½ per cent. in the case of the South Metropolitan Company, and of 11 per cent. in that of the Commercial Company. All this was conclusive evidence that this portion of their business, at any rate, was a sound one, and was still growing. The amount of building going on in the north-west of their district would probably still further increase this branch of the business. Of course, this progress had made itself evident in the capital expenditure; and it was a peculiarity that on this occasion, out of the amount spent on capital account, the cost of new and additional plant at the manufacturing stations had been only £40,764, whereas the extension of the distributing plant—that was, mains, services, meters (especially automatic), and gas-stoves—had cost £119,688. They foresaw that the expenditure on automatic meters would continue to be at a considerable rate for some months longer; and therefore last December they decided to raise further capital, and they issued (as the proprietors were aware) £100,000 of their "A" stock, which, at the price tendered for it, yielded £292,816. Nearly the whole of the amount would be devoted to the development of the automatic meter system; and—he would not say that he was sorry for it, but he might inform them that it would be necessary to still further increase the capital on this account. Probably, therefore, about the middle of the year, they might put out another £100,000 of capital for carrying on this work. The necessity for so doing would be apparent to them when he mentioned that, at the present time, they had orders for automatic supplies coming in at the rate of 600 a week, while they had orders on hand, which had not yet been carried out, amounting to 16,000 meters. The fact was that they had not been able to get the meters fast enough The Deputy-Governor reminded him that they were still spending £10,000 a week in getting these meters into position and fixing them. Before leaving the question of manufacturing capital, he might state that of the £40,000 which had been expended in the past half year £14,200 had been on labour-saving machinery, which was proving itself highly satisfactory. They had also charged on account of the new meter-testing house and stove repository at Fulham—this being necessary in consequence of their increased business—the sum of £7500; and the total cost of this would be about £20,000. The outlay was, however, absolutely necessary if they were to carry on their business with facility, to say nothing of comfort. With respect to the issue of capital to which he had referred, he had stated that they had had expansion all along the line; and he thought that in nothing had the expansion been more apparent and more marked than in the Company's credit. When the auction clauses first came into operation, they issued capital in the year 1879—the "A" stock—at £175; in 1880, it went up to £185; in 1882, when the great electric light scare took place, it dropped to £170; in 1883, it rose to £185; and in 1884, it jumped up to £225. In 1892, there was a coal famine; and they had to raise the price of gas, and consequently to lower the dividend. The price then fell to £210; in 1893, it rose again to £221; and for the issue last December, they obtained £292. They had not issued any capital since 1893; but there had been an improvement in the value of their stock and credit in the interval of £71 per cent. In spite of having raised more capital, their expenditure per ton of coal now stood at only £6 0s. 6d., against £6 7s. 10d. the corresponding half year; and, notwithstanding the extra dividend now recommended of ½ per cent., the total charge for capital per 1000 cubic feet of gas, in the shape of dividend and interest, was 1s. 1·63d., as compared with 1s. 1·81d. in 1894. The new capital, therefore, had not cost them much. The actual work done in the matter of distribution during the half year had been the laying of 2992 new service-pipes to ordinary customers, and 9812 new service-pipes to automatic meter customers; providing 2518 new meters to ordinary customers, and 18,249 to automatic customers; providing 7262 new stoves to ordinary customers, and 21,210 to automatic

customers. The numbers of their consumers were now, therefore, raised respectively as follows: Ordinary, 215,629; and automatic, 29,035. As regarded the latter, an increase was going on week by week, and very soon a much greater number would be shown. They had 72,811 ordinary consumers' stoves, and 29,035 automatic consumers' stoves. They had to express to the consumers their very great regret for the inconvenience which had been caused by the delay in fixing the prepayment meters; but this had arisen simply from want of the necessary meters. So great had been the demand, not only in London, but all over the country, that the meter makers were wholly unable to cope with it. Turning to the revenue account, it would be seen that the gas-rental showed an increase of £37,598 on the December half of 1894. This, however, was not the true measure of the improvement; for in the September quarter of 1894, the price of gas was 3s. per 1000 cubic feet, whereas, for the whole of the past half year the price had been 2s. 10d. Had the price per 1000 feet been the same in both half years, the increase in money would have been £62,618. Meter-rents having been abolished, the revenue for the half year had lost on that account £29,175. On the other hand, there had again been a small, but a very satisfactory, increase in the rental of gas-stoves. This, again, was not an exact indication of the actual increase in the use of gas-stoves, because their system and desire was to sell as many as they could. They offered every inducement to their customers to become possessors of their stoves; and, of course, there was no rental received in respect of those they sold. The only dark feature in the history of the half year—and it was common to all gas companies—was the low condition of the residuals market. As regarded the principal item—coke—the Directors stated in their report that the sales had not been unfavourable. The average sale price for the half year had been a high one—12s. 3d. a ton. The Directors were quite prepared to be called upon to accept a lower price for their Beckton coke than that which existed under the contracts that came to an end in October; and they made several contracts at satisfactory prices without any trouble whatever. The only difficulty that had arisen was in the case of the cement makers, who formed an important section of their coke purchasers. These gentlemen had so far declined to buy from the Company. A large number of the members of the trade had to his mind—he expressed only his own view—unfortunately taken a leaf out of the coalowners' book, and had formed themselves into a "ring," or, as they themselves called it, an "alliance," with the one object of keeping down the price of coke. The coal "ring" lasted, for all practical purposes, only one short year; it remained to be seen how long the cement makers' "ring" would exist. But the Company did not feel justified in accepting a lower price for their coke than that paid to other Companies in the Metropolis—especially where these gentlemen had given the same prices coupled with conditions less favourable than those to which the Directors of this Company brought themselves to consent in their desire to keep up an old connection. There was, however, another outlet for Beckton coke—that of export; and they were now selling considerable quantities of coke to parties abroad. He only hoped for the sake of the cement makers here that this coke would not get into the hands of cement makers abroad. The action of the cement makers was based on what had been stated over and over again—the very depressed condition of the cement trade; and no doubt that was the case for some time. But latterly a change for the better had taken place; and the best evidence of this was given, he thought, in the statement of one of the most important firms in the cement trade, who were applying for some debenture capital. In the letter inviting tenders for this capital, the following statement was made: "The deliveries during the second quarter of 1895 were greater than during any other three months in the Company's history; and, in spite of serious curtailment of business in the early months of this year, when shipments by water were almost entirely suspended during the prolonged frost, the Company's deliveries for the first 26 weeks of 1895 were in excess of those of the corresponding period of last year. It is well known that the demand for portland cement is an increasing one all over the world, and that it has not only maintained its supremacy as the best hydraulic cement; but it has superseded lime for many building purposes." Again: "Prices of portland cement are above those ruling at the same time last year, and are advancing, owing to an increased demand and diminished stocks." In addition to this statement from inside the cement trade, they had the returns of the Board of Trade. He had had these carefully scrutinized, with the result that he found that during the past three months the exports of cement had been increased by 10 per cent. over those of the corresponding period. Under these circumstances, he did not think they were called upon to sell their coke to these gentlemen at a lower price than they received from buyers in other businesses. Of course, the immediate effect of this boycott of their coke by the cement manufacturers was to inconvenience the Company a good deal with their large stock of coke at Beckton. But it would make them look out, with a view of putting their coke business on a wider basis, instead of keeping it, as they had done, for those whom they had expected to buy it. With regard to breeze, there had been a falling off in the demand; and so there had been a reduction of £1900 in their revenue under this head. Tar and tar products had yielded fairly good prices. The reduction as compared with December, 1894, was the result of a fall in the price of anthracene on the one hand, and of the serious increase in the cost of barrels on the other. They used nearly 100,000 barrels in a year; and the large advance in their price had affected the Company rather seriously. The worst market of all had been that of sulphate of ammonia, the price of which had gradually fallen from £13 in the autumn of 1894 to about £8 now. Whether the present low price would stimulate the demand—an effect which the low price of 1895 did not have—or whether they would have to wait until the agricultural classes were in a better condition, and had more money to spend, or until there was some further improvement in the sugar-growing industry, were questions to which no one could venture to give an assured answer. The policy of the Directors, however, had been the same throughout the depression—namely, avoiding glutting the market, and only feeding it according to its requirements as well as they could judge them; and they had kept the market supplied from time to time according to its requirements. He was glad to say that the stock they had at Beckton was at the present moment decreasing; and they had also had another reassuring piece of news within the last day or two—namely, that the nitrate-producing companies were restricting their output, and had entered into a convention with this object. This had already had the effect of raising the price in the market; and if it had a larger effect in the same direction, there was no doubt that sulphate of ammonia would rise in price. The anxiety of the Board with respect to dealing with the residuals was very great. They did the best they could on their responsibility, and according to their judgment. They were very often found fault with; but they were not going to alter their policy in order to "suit the book" of other people whose views were different from their own. If the shareholders were not contented, the Directors would be very happy to hear criticisms from them; and if the Board of Trade, or anyone else representing the public, wished to complain, a hearing would be given to them. But to anonymous complaints in the Press, they would pay no heed whatever. As regarded their large stock, it was true that at first sight it looked a little alarming; but they had discounted any possible loss on the value of their residuals by taking the valuation at such a price that the Company were perfectly safe. In support of this statement, he might recapitulate what had been the result of the valuations in the past. During the ten years which had just elapsed, the aggregate values put upon their stocks had been £1,475,000; whereas the price realized on their sale had been £1,725,000. So that, in these ten years, there had been—he could not call it a profit, but an excess of £250,000 over and above the sum taken as the value of the stocks held by the Company. This was evidence that the Board did not rashly pile up stocks, and value them in their books too highly. Turning to the expenditure, there were two most satisfactory features. The first was the cost of coal, which, including enrichment and charges, had been the lowest on record—namely, 11s. 1½d. per ton; the contracts for the current twelve months having been arranged at an average reduction of 11d. per ton, compared with the 1894-95 contracts; and labour-saving machinery was, moreover, beginning to tell upon the cost of handling the coal. The second satisfactory feature was that while the gas trade of the Company had increased by 4·86 per cent., the total expenditure under the head of manufacturing had increased only at the rate of 0·26 per cent.—that was to say, the whole of the increased business, which amounted to a sale of 438 million cubic feet, had been obtained at a cost of £2438, or 1·33d. per 1000 cubic feet. The cost of distribution, however, showed a very considerable increase. But so much of this as was more or less directly attributable to the new source of income—the automatic meter customers—£30,000 at least, must not be looked upon otherwise than as a *quasi*-capital charge; and they must expect to see this charge continued for several half years to come, as this business increased. He remembered explaining last August that the cost of this was carried to a suspense account, and that it would be charged on a liberal scale each half year to revenue account, out of which it would be gradually liquidated. It would be interesting to the shareholders, perhaps, if he gave a few figures with respect to the working of the slot meters, because this was almost a novelty in gas distribution. In the northern and eastern divisions of their district, the proportion of automatic meter consumers to the ordinary consumers was 18·6 per cent.; south of the Thames, it was 51·5 per cent.; in the City, it was only 1·6 per cent.; in the West-end, 1·3 per cent.; in the west of the West-end (down in the potteries and the small places), it was 11·5 per cent.; and in the west central division, it was 9·5 per cent. These figures corroborated very strongly what he had always urged from the chair—the differential load-factor in the different parts not only of the Company's district, but in the Metropolis at large. He received a letter a few days previously from the Vicar of St. Peter's, Hatton Garden, who complained bitterly that the Company did not reduce their price to that charged on the south side of the river. This matter had been explained over and over again; but it did not seem that it could be got into the clerical mind. He thought, however, that the figures he had just read—especially those relating to the south of the Thames as compared with the figures applicable to the City and the West-end—showed conclusively the very great difference that there was in the load-factor—the amount of the regular consumption of gas in different portions of their district. He might mention another fact with respect to these automatic meters. The consumption (limiting the calculation to those cases where the customer had been burning gas for the full six months) per meter per month averaged 1875 cubic feet; and if something approaching this rate was found to be continuous throughout the year, the average annual consumption per meter would be upwards of 20,000 cubic feet, which was much larger than they originally expected. The figure was larger, he believed, than had been the experience of some of the other companies; and the improved returns, they thought—but they might be wrong—arose from the fact that, in almost every case, they issued a cooking-stove with an automatic meter. This accounted also for the larger outlay that had been incurred in instituting this automatic system. The gross collection for the automatic meters during the half year was £30,710; the whole of this having been in penny copper coins. The number of coins handled had been 7,370,535; and their weight had been over 63 tons. This was equal to a daily collection of 50,000 coins, weighing nearly ½ a ton, or 3 tons per week. At the present time, the daily figures were 100,000 coins; so that they now handled about 6½ tons every week of the people's pence. It had been rather a problem how to get rid of all this coin, which was as good as a copper mine; but they had hit on a plan which so far was working very well. They got rid of it by paying a small percentage. All this business had, of course, necessitated an increase in the number of their collectors (they had now 48 more); and there had been a corresponding increase in the clerical staff. The successful way in which this business had been started, certainly reflected the highest credit on the rental department and outdoor staff. In having to cope with an entirely new method of distributing gas, the wonder was—not that there had been so much delay, but that they had progressed so satisfactorily; and he was sure the shareholders would agree with him in thanking those gentlemen in whose hands it had been. They had again to make the old groan about the rates, which went up pretty regularly every half year. In December, 1894, they amounted to 6s. in the pound; and now they amounted to 6s. 3d. The quinquennial revaluation was going on now; and it was referred to in the report. The costly litigation which was so much complained

of in some quarters had resulted in this—that nearly the whole of the Assessment Committees had loyally accepted the guidance of Sir Peter Edlin's judgment of 1892; and in only some half-dozen cases had the Company had to give notice of appeal to Quarter Sessions. He hoped, however, that they would avoid having any litigation. The increase in the payments for rates was not so much the effect of an increase in the assessment as in the amount per pound, which was fixed by the wants of the public. The rates which the Company now paid amounted to 2·58d. per 1000 cubic feet; so he supposed they must be almost the largest ratepayers in London. Bad debts showed a reduction, partly in consequence of the reduction in the price of gas, and partly through the improvement in trade. There was a small increase in the annuities; this being the effect of the extension of the system they had lately introduced of pensioning old and disabled workmen of 65 years of age and upwards. They found that this had had a good effect on the working of the Company; for they got rid of what was always a very bad feature in their works—incompetent men, not incompetent through their own fault, but through age, and such men could not be discharged. This amount had not yet reached its full extent; but when the system got into full working order, the amount would be fixed, with a tendency to decrease. Perhaps the shareholders would remember that last October there was a serious explosion in New Church Court, Strand, which was attended most unfortunately by one death—that of a fireman. In addition to this, there were many cases of serious personal injuries, and of damage to property. As the matter was now *sub judice*—that was to say, the question of liability—he hoped that the meeting would be content with the assurance that, without admitting any liability on the part of the Company, the Directors promptly settled the claims of many of the injured persons, several of whom belonged to the class of the very poor, and who, but for this action on the part of the Directors, would have been rendered destitute. The question of compensation for structural damage to house property in the neighbourhood was on a wholly different footing. Whatever the amount the Company might ultimately be called upon to bear in connection with this explosion, it would be charged against the insurance fund, and not against revenue. The report informed the proprietors of the loss the Company had sustained by the death of Mr. Farnan, who for the past twenty years had been a most painstaking Auditor. The office of Auditor to this Company was no sinecure; and its duties required a long attendance once, and sometimes twice a week. The election of a successor to Mr. Farnan rested with the proprietors; and this business would be taken after the report had been disposed of. They had also to lament the death of the Government Auditor, Sir Henry Calcraft, whom he had known personally, both in public and private life, for many years. He entirely joined in the tribute which had been paid in the public Press to the extraordinary ability and courtesy, and to the genial character of the man. It would be very difficult indeed for them to have so agreeable and so thoroughly competent an Auditor to represent the Board of Trade. He (the Governor) might say that a provisional appointment had been made. Whether or not it would be permanent, he could not say; but they had been informed by the Board that, for the present, Mr. Seymour Gore would act as Government Auditor. With respect to the question which he mentioned last half year—the proposed new standard of light, the pentane burner—the matter had been advanced another step. The report of the Committee—consisting of one representative from the Company, one from the South Metropolitan Company, and one from the Commercial Company—had been considered by the Board of Trade; and he thought they might say that the permanent officials of the Board appeared to appreciate the views of the Gas Companies as to what was necessary to be done in order to place the official testing of gas on a less unreliable basis than at present. They hoped that the remaining points now under discussion would be speedily settled, and that the new system might be sanctioned in the current year. The present system was bad for everyone. Gas Companies, shareholders, and officials all suffered from it; and consumers suffered more than anyone, because, in order to satisfy the requirements of the most scrupulous public tester, the gas had often to be enriched beyond what was necessary, at a very serious cost for enriching material. He had to apologize for having kept the meeting so long. It was, he thought, needful to enter somewhat fully into their affairs, because they only met once in six months; and probably the proprietors felt interested at hearing all that had been done in the meanwhile—especially in such an interesting half year as they had had. He might say that, as far as he could judge, the prospects of the Company were undoubtedly good; but it must not be forgotten that, in the present half year, they had to compare with eight weeks of unparalleled frost last year, which raised the consumption of gas by 10 per cent. They were doing fairly well at the present time, and were only 1 per cent. behind; and he hoped that they might approach very nearly, or within a reasonable distance of, the consumption in the extraordinary half year with which they were now comparing. They hoped also to get their coal fairly cheap, and they further trusted to see an increase in the value of residuals.

The Deputy-Governor (Mr. Howard Charles Ward) seconded the motion.

Mr. George Livesey observed that he had been silent at their last two or three meetings; and if he were animated by any ill-feeling to the Company, he should be silent on this occasion also. He could assure the shareholders that he should never forget the warm reception they gave him six years ago, and the just and generous suggestion made by them on that occasion. His interests were identical with theirs—not only as a shareholder, but as being interested in the gas industry especially more than in anything else. The Governor had said nothing about the first paragraph in the Directors' report. On the day that the dividend was announced, he (Mr. Livesey) met a stockbroker, who said: "I have done Chartered stock at 302. They will show a bigger dividend still. They carry forward £164,000." He (Mr. Livesey) replied: "But you do not remember what they brought forward. That £164,000 is £92,680 less than they brought into the half year." This meant more than 2d. per 1000 cubic feet in the price of gas. So far from paying a larger dividend, it looked to him that the present half year was not at all promising for the Company; and he thought there was a probability of a lower dividend, and, possibly, an increase in the price of gas. The reduced amount carried forward meant 2d. per 1000 cubic feet in the price of gas. They were charging 2s. 10d.; and this meant that they would require 3s. to pay their way. It was true they did not charge meter-rent; and he thought it was a great pity this had been taken off. As compared with another Company, they required 9d. per 1000 cubic feet more for them to pay 12¾ per cent. than it did in the case of the other Company to pay 13 per cent. If this did not bode trouble, he did not know what did. They required 33 per cent. more for their gas than was required by another Company in a poorer district. The Governor had spoken of the Company's increased sale of gas for public lighting as compared with the sale by the South Metropolitan Company, and had stated that in the past ten years The Gaslight and Coke Company had had a larger increase than the South Metropolitan Company. This simply meant that more new streets had been made in the northern than in the southern part of the Metropolis. With regard to private lighting, however, he found that The Gaslight and Coke Company had sold in the past half year less than in the December half of 1890 by 54 million cubic feet, or about ½ per cent.; whereas the South Metropolitan Company in the same interval had had an increase of 20 per cent., taking public and private lighting together. He thought this was a very serious matter indeed. The question for the Board to consider was how and why it was that this great Company—the pioneer company of the world—having the finest district in the world, had an unprecedented record of going back. Never in his experience had there been such a case. The general course of a gas company had been forward; but, as he had stated, this Company had sold ½ per cent. less gas in the past half year than was sold five years ago. With regard to the fourth paragraph in the report, he thought it contained some words which were rather misleading. It was said that "the Board of Trade returns show that the cement manufacturers, who are considerable buyers of the Company's coke, are participating very largely in the marked improvement which has taken place in the general export trade of the country." This was certainly true, but was only partly true. The cement manufacturers were participating in the increased quantity sold; but they were not benefited by any increase in value. In December last, taking the Board of Trade returns, the increase in the quantity of cement exported was 26·3 per cent.; and the increase in value was 26·4 per cent.—showing that, while the manufacturers were largely increasing their business, their profits were not increasing. The reason for this, he was told, was that the foreign cement makers were able to produce cement cheaper than the English. It was not correct to say that the cement manufacturers were very largely participating in an improvement, when they were not participating in any improved profit. With regard to the question of coke, in 1894 they were all selling coke at what they considered a very good price—a little more than 11s., and something under 12s. per ton. He had certainly expected that with the fall in the price in coal, the price of coke would necessarily go down; and on the other side of the Thames they had been quite prepared to make their contracts for 1894-95 at a lower price. A large cement maker, however, one day came to the South Metropolitan Company when he was in the office, and made this astonishing offer: "I will give you 12s. 6d. per ton [that was, 10d. per ton more than the old price] for a contract next year; and the more you let me have, the higher the price I will pay you." This was an astonishing proposition to make; and it was brought before the Board of the South Metropolitan Company. They did not ask this gentleman for any higher price; and they accepted the 12s. 6d., but not for the total quantity asked for. The person in question then went to The Gaslight and Coke Company, and no doubt said very much the same thing; and—he (Mr. Livesey) did not know how it came about—he bought coke from this Company at 13s. 6d. per ton, a most extreme price. That, however, fixed the price for the cement makers at 13s. 6d.; and the Company sent out notices to their contractors—as did also the South Metropolitan Company, although not quite in so peremptory a manner—stating that the contractors could have so much coke at 13s. 6d. a ton. They had to accept the coke at that price—with a pistol at their head, or they could have none. This brought the price up to 13s. 6d. He would not go into the motives of the buyer to whom he had referred; but the effect of his proceeding was to fix such a price for coke that the cement makers could not afford to pay it. He believed that this would have had a very serious effect on the weaker makers. But a way was found out of the difficulty. They discovered that they could buy anthracite coal at a lower price. Although coal had not hitherto been used for cement making, the manufacturers found that they could use one-third coal instead of coke; and they substituted coal to this extent. On the other side of the water, it was felt that a mistake had been made in fixing the contracts at these high prices; and after they had been three months in force, the Directors voluntarily said to the cement makers: "We have charged too high a price, and will reduce it to 12s. 6d., giving you the benefit of 10d. a ton for the remainder of the contract"—the price on the other side of the river being 13s. 4d. The cement makers accepted this offer in the spirit in which it was made. Personally, he thought the reduction should have been larger. The cement makers came and asked The Gaslight and Coke Company to do the same. But, of course, the Company declined; saying, however: "We will cancel the remainder of this contract if you will agree to another, extending over another year—from, say, March, 1895, to September, 1896—at 12s." He believed this was the figure. But seeing that the cement makers were able at the time to buy coke in the open market at much less than 12s. a ton, they declined the offer, and went on fulfilling their contracts at 13s. 6d. up to September. The Company had a highly respected and worthy officer, who had managed their coke business for a great many years; but when September came, instead of letting this gentleman negotiate, and thus follow their usual course, the Directors advertised for tenders. If any man could blame the cement makers for combining, remembering what they had suffered at the hands of the Directors of this Company, he was not that man. They tendered 9s. 6d.; but the Company stood out for 10s. They had stood out for this price up to the present; and the cement makers had refused, up to about a month ago, to give more than 9s. 6d. The Governor said that the Company asked

10s. because the cement makers had given another Company that price. They had given the South Metropolitan Company 10s. because that Company dealt with them liberally and fairly. But they had refused to give this Company 10s. because the Directors had not dealt with them liberally. The cement makers had a meeting with the Board a month ago that day, and offered 9s. 6d. The Company had an enormous stock—136,000 tons—on December 31, which had since greatly increased, and was still increasing. The cement makers knew (he did not know how) the quantity of stock held by the Company; and they offered 9s. 6d. [A Voice: 9s. 9d.] The Directors, however, stood out for 10s., although the day before they had reduced the price at one of the Company's yards to 7s. 6d. a ton to any dealer who chose to buy 12 tons. Nevertheless, they refused 9s. 9d. which was offered by the cement makers. He felt that, in acting as they had done, the Directors had themselves to blame for the present position. They might have sold their coke at 9s. 9d.; and the result of refusing this offer was that they had on hand an enormous stock, which was injuring the trade all round. He wanted to see the gas industry progressing; but he felt there were two methods of doing business. One was based on an authority no one could dispute: "With such measure as ye mete, it shall be measured to you again." The other maxim was buying in the cheapest and selling in the dearest market. He did not know whether the latter system would hold water under all circumstances; but he thought that the Directors might at any rate display a little consideration for other people. There was a good deal of human nature in men; and if men felt that they were being dealt with fairly and honourably, they responded. He believed that the cement makers had a grievance; but he also believed that if the Company sent their trusted officer to them, deputed to negotiate with them, the cement makers would meet them in a friendly, and not a hostile, spirit. He especially commended to their consideration another point—that they were charging very high for their gas; and this boded trouble. Five years ago The Gaslight and Coke Company required to pay their interest and dividend a little over 2d. per 1000 cubic feet more than was needed by the South Metropolitan Company. But this difference was now increased to rather more than 3d. per 1000 cubic feet. There was thus a difference between the working of the two concerns of 9d. So there was room for improvement and economy to the extent of 6d. per 1000 cubic feet. The Governor said that the Company would make no change; but he believed they would.

The Governor: Will you explain the 6d. per 1000 cubic feet?

Mr. Livesey replied that the South Metropolitan Company paid their way with a charge of 2s. 3d.; but this Company could not do so for under 3s. There was a difference of not quite 6d., because of the meter-rental; but he would say 5d. He believed, as the Governor had said, that the Directors were doing their best for the Company; but the Governor had remarked that it was a source of great anxiety to them. He (Mr. Livesey) believed they were following a wrong tack. Instead of treating their customers as men, they tried to ride roughshod over them. The Company had a splendid lot of officers, who would compare with any in the world; and if they were trusted, and were all induced to work loyally together, there was no reason why the good old ship, the Chartered Company, should not start on a new voyage of prosperity, the end of which no man could see.

Mr. White, who stated that he was Chairman of the Cement Alliance, said he had not known that Mr. Livesey was going to speak; and if he had known that he would not have been aware of what he was going to say. Mr. Livesey had put the case of the cement manufacturers before the meeting. He (the speaker) ventured most respectfully to protest against the statement made by the Governor as being in some degree misleading. He undertook, however, to reply to it, if he found it possible to do so, as he believed he would, and to put the answer in print for the shareholders to read; and they would then see whether what the cement makers had to say on their own behalf corresponded with what Mr. Livesey had stated. If the shareholders were inclined to go away from the meeting with the idea that the cement manufacturers had united themselves together for the purpose of boycotting this great and powerful Company, they would go away with a most mistaken idea. The cement makers had bound themselves together in the general interests of their trade; but the purchase of their fuel was only one of those interests. They had no idea of boycotting anyone; and they had not boycotted either The Gaslight and Coke Company or the South Metropolitan Company. With respect to the figures which the Governor had mentioned, some allusion to them would no doubt appear in the statement which he (the speaker) would endeavour to bring to the notice of the proprietors. He would only venture to remind them that figures could be made to show anything. He desired to add that he was not the cement maker who had called upon Mr. Livesey.

Mr. Livesey: I do not think he is a member of the Alliance.

Mr. White (continuing) stated that if the shareholders went away with another impression—namely, that there was a general feeling of hostility on the part of the cement makers towards the Company—they would also make a great mistake. The cement makers, however, did not consider that they had been treated liberally by the Company. He saw sitting at the table a gentleman who was as large a buyer of cement as anyone who came into that room; and he thought that if the Directors had approached him in the same rigid way that they had often approached many members of the trade, he would not like it. It appeared to those for whom he was speaking that buying and selling was a matter of mutual arrangement, and sometimes of mutual concession. With all due respect to the Company, and all recognition of their great powers, and despite the personal regard which some of them might have for certain of the Directors, the cement makers felt bound to protest against the action which had been taken towards them. They had been obliged to make their union in self-defence; and it was in self-defence, and not in the spirit of agitation, that they had been obliged to take the action they had taken, and which should be more fully explained to the proprietors in the manner he had indicated.*

Mr. Rokeby Price asked whether he had understood from the Governor that the cement makers were giving a different price for their coke to other gas companies than they offered to The Gaslight and Coke Company. They had heard from their "prophet Jeremiah" a tirade on the iniquities of the Company. But he should like to ask whether, if a person came and offered him more for a horse than he was ready to take for it, he was to say, "No; I will take less." Did not the cement manufacturer who went to the South Metropolitan Company with his offer make the market price of coke? Was a buyer who was under a contract at a certain price to claim a reduction if the price fell? What they had to do was to deal with the higgling of the market; and the higgling arose from a buyer offering a certain price, and the seller offering another. Mr. Livesey always had some complaint to make against this Company. It did appear to him (the speaker), however, that there was one point to be considered, in this matter, and that was whether coke did not depreciate in value by keeping. [A Voice: Yes.] At the same time he did not want to criticize the Directors' management. He was sure the proprietors had been very glad to hear that the Directors were pensioning off the Company's old men. He thought that this was a most Christian act.

The Governor, in reply, said he could assure Mr. White that he had not the slightest complaint to make as to the way in which he had laid his case before the Board. He (the Governor) had quoted statements in the circular issued by Mr. White's Company; and if they had to be explained away, the printed memorandum which Mr. White had promised them would be in the proprietors' hands, and they could then put their own interpretation upon it. Mr. Rokeby Price had laid down very sound commercial principles, which he thought must govern them as business men in their own private affairs. It was perfectly true, as Mr. Livesey had said, that an important cement maker came to them and offered the price mentioned, and they took it; and the same price was taken by nearly all their purchasers. Were they, in the interests of the Company, to refuse the price that was offered to them, or to act as Mr. Livesey appeared to have done—thinking that he had charged too much, and therefore give a rebate? He (the Governor) held a very different view of the sacredness of a contract; and he was perfectly certain that had the boot been on the other leg, the cement makers would not have come to them and said: "We have given you too little for your coke, and we wish to increase the price by 2s. a ton." What was right in the one case, was right in the other. The price was fixed by the buyer, and other buyers gave it also; and there was no question of putting a pistol at their heads. The pistol that was applied to the heads of the buyers was an advertisement in the public Press for tenders for coke. They said that they had a certain amount of coke to sell, and they, therefore, invited tenders. They received tenders from cement makers at 9s. 6d.; and the Company had sold at 10s. Why should they sell coke to cement makers at a lower price than to other people? It was all very well for Mr. Livesey to come there and complain of this Company. But he had himself taken 10s. from the cement makers; and why their Company was to take less than the South Metropolitan Company, he was at a loss to understand. They had been seriously inconvenienced by keeping the coke for the cement makers; and in this respect they had made a mistake. Another time they must export it. It was better to make a small loss than to lose on the value of the coke. The only reason they had in keeping their stock was in order not to put the cement makers "in a hole," if they should think better of their decision not to accept the Company's terms, more especially as they had accepted the terms of the South Metropolitan Company. Mr. Livesey had refrained himself from two or three yearly meetings; but he had "let himself go" that day. Mr. Rokeby Price had called Mr. Livesey's statement a "lamentation of Jeremiah;" and it was something like it. Mr. Livesey had pointed out that this Company's property was slowly, but surely "going to the dogs;" and that there had been a continual decrease in their gas revenue. Mr. Livesey was usually very accurate; but in this particular he was not.

Mr. Livesey remarked that he had not said that the decrease was continual; but that there had been a decrease comparing December, 1890, with December, 1895.

The Governor (continuing) stated that theirs was not the only Company that showed a decrease in 1893. The South Metropolitan Company, the Commercial Company, the Brentford Company, and all the Metropolitan and Suburban Companies went down in their sales at that time; and if there was any declension in this Company in 1893, it was common to all Companies. The difference existing between their district and that of the South Metropolitan Company had been explained over and over again. He had already remarked that this difference could not be got into the clerical mind; but apparently it could not be got into the commercial mind. In the one case, there was a continual set of consumers who were burning gas all the year round; whereas he had shown the meeting that day that, in this Company's district, they had large areas where gas was probably only burnt for three months in the year. Notwithstanding that, they had to be in a position to supply gas all the year round to those places; and capital employed for this purpose had to be paid for. This was not clear to Mr. Livesey, but it was to the Legislature, as they gave the Company 3d. per 1000 cubic feet more as their initial price under the sliding-scale than they gave to the South Metropolitan Company. He did think Mr. Livesey might spare them these continual attacks. That gentleman had told them he had no doubt that the good old ship would float into port; and he (the Governor) had no doubt it would, if shareholders like Mr. Livesey did not scuttle it. Their property, however, was too solid to be damaged, even by Mr. Livesey's criticisms. The 7s. 6d. per ton quoted by him was a yard price; and it was made in the depth of winter in order to clear the yard.

Mr. Livesey: No; it is going on now. It was reduced to that price a month ago yesterday.

The Governor (continuing) stated that Mr. Livesey knew perfectly well that the price in yards was marked up by a board, which was shifted every now and then, and, of course, it had nothing whatever to do with the wholesale trade. That referred to a price extending over a year—a contract price; and he thought it was rather "special pleading" on the part of Mr. Livesey to have introduced this point. As regarded the cement makers, the Company were most anxious to dwell peaceably with all their customers. But they would not submit to the dictates of a "ring;" and they would rather suffer loss than

* Mr. White's statement appears in our "Correspondence" columns to-day.—Ed. J.G.L.

put themselves under the thumb of a combination. Combinations were contagious; and if applied to cement, why not to coal? and if to coal, why not to labour? They had all, however, denounced the labour combination.

The motion was then put, and carried unanimously

The dividends recommended were afterwards declared; and resolutions were subsequently passed re-electing the two retiring Directors, Mr. John Aird, M.P., and the Hon. Henry Noel; electing the retiring Auditor, Mr. H. W. Chisholm; appointing Mr. Allen Stoneham an Auditor to fill the vacancy caused by the death of Mr. Francis Farnan; and authorizing the Directors to dispose of such further portion of the Company's property as was not now required for the purposes of their undertaking.

A vote of thanks to the Governor and Directors having been passed,

The GOVERNOR, in reply, said he was greatly indebted to them for their confidence. He hoped they would permit him to add a rider to the vote, and extend it to the Company's officers. Mr. Livesey had said, in an injured way, that the Directors were given to "riding rough-shod" over their officers.

Mr. LIVESEY: No; I said some of your customers.

The GOVERNOR was very glad to hear this; but he had thought Mr. Livesey referred to their officers. At any rate, the very last thing which any member of the Board would do would be to treat any officer of the Company in anything but the most generous way—recognizing as they did the faithful and loyal manner in which these gentlemen discharged their duties.

The proceedings then terminated.

SOUTH METROPOLITAN GAS COMPANY.

The Proposed Unification of Capital.

At the conclusion of the business at the Ordinary General Meeting of the above Company to-morrow, the shareholders will be asked to assent to the provisions of the Bill which the Directors have promoted for effecting a complete unification of the capital. To help them to a clear comprehension of the question before them, there has been issued to the holders of "A" and "B" stock a full statement of the position. It is signed by the Chairman (Mr. G. Livesey), the Deputy-Chairman (Captain T. B. Heathorn), and Messrs. Cardwell, Ewart, Morton, and Simpson Rostron (Directors).

It is pointed out, in the first place, that the whole of the ordinary 10 per cent. stock of the Company, receiving under the sliding-scale 13 per cent., is to be converted into two-and-a-half times (the exactly equivalent amount) of ordinary stock with a standard dividend of 4 per cent., but receiving under the sliding-scale, on the same basis, an exactly equivalent dividend of £5 4s. per cent. This is the whole bearing of the Bill on the "C" stock; but more is necessary in the case of the "A" and "B" stocks. With a nominal 13 per cent. dividend, the "A" stock is entitled to £15 14s. per cent., though the actual dividend paid on that stock has only been £15 10s.; while the "B" stock is entitled to, and has received, 12 per cent. The dividends payable on the respective stocks rise or fall for each penny variation in the price of gas, at the following rates: "A," 11s. 9d. per cent.; "B," 2s. 6d. per cent.; "C," 5s. per cent. It is considered to be most desirable that these differences—this divided interest—should, for the benefit of all classes of the shareholders and of the public, be abolished, and that all the proprietors should have an equal interest in the working of the Company under the sliding-scale.

The differences it is proposed to abolish are due to the circumstances of the three original Companies at the time of the amalgamations in 1879-80. The old South Metropolitan Company was in a better position than the Phœnix and the Surrey Consumers' Companies, having a much smaller relative capital. The Company were paying 1½ per cent. more dividend, and were charging 3s. per 1000 cubic feet, or 4d. less than the Phœnix, and 9d. less than the Surrey Consumers, for gas. They were working under the sliding-scale with a 3s. 6d. initial price, and had amalgamating powers. They possessed a large area of unoccupied land, and considerable unexhausted capital powers. The other two Companies were under the necessity either of applying to Parliament for additional capital and land, or of amalgamating with the South Metropolitan. They preferred the last-named course, and agreed to terms that were calculated to maintain the relative positions of the stocks of the respective Companies.

The Schemes of Amalgamation provided that the South Metropolitan, or "A" capital of £500,000, and the Phœnix and Surrey, or "B" capital of £1,350,000, all with a standard dividend of 10 per cent., were to share equally in dividend up to 11 per cent.; and if at any time a higher dividend than 11 per cent. became payable, then "one-half of such larger dividend beyond 11 per cent. that, but for the agreement, would be payable to the holders of 'B' capital, shall be paid to the holders of 'A' capital, in addition to their own proportion of such larger dividend."

The price of gas was reduced within twelve months after the first amalgamation to an all-round figure of 3s.; and it is now 2s. 3d. The average dividend due on the "A" stock for the past ten years has been £15 10s. 5d.; and £15 7s. has been paid. On the "B" stock, the average due and paid has been £11 19s. 3d.

The £1,850,000 "A" and "B" 10 per cent. sliding-scale capital will be converted into £4,625,000—an exactly equivalent amount—of 4 per cent. sliding-scale capital. This total can neither be increased nor diminished, and must be divided between "A" and "B" in agreed proportions. If one desires more than a fair share, the other would have to take less. The essential question: What is the fair share of each? is happily confined within very narrow limits. Neither "A" nor "B" shareholders can be asked to accept a smaller amount of the new capital than will be sufficient to yield the same income as they have received uniformly during the last five years, and for eight years out of the last ten—viz., "B" 12 per cent., "A" 15⅝ per cent., but entitled to £15 14s. per cent.; these being the dividends payable with the price of gas at 2s. 6d. per 1000 cubic feet—a figure which has not been exceeded since 1885. It is therefore fair to assume that the price will not go beyond this in the future; consequently, the dividends are more likely to rise above than fall below the present rates.

The Directors have given the question the most careful and earnest consideration in all its bearings; and they have decided to recommend the following figures as in their opinion fair both to "A" and "B" shareholders: The fractions of dividend, varying from 6d. to 4s. per cent., from time to time due to, but not paid to, the "A" stockholders, were not required by the resolutions passed at the half-yearly meetings to be carried to the reserve fund, but have been invested in the purchase of £2926 of "A" stock, which, strictly speaking, belongs to the "A" stockholders. It is proposed to cancel this, and to divide the total amount of new stock to be appropriated to the "A" stockholders among the remaining holders—that is, the present £500,000 of "A" stock, less the £2926, or £497,074, is in their hands, and among them the total new stock allotted to "A" of £1,486,250 will be divided. If this is done, it will give £299 for each £100 of "A" stock, and will leave £3,138,750 to be divided among the holders of "B" stock, which will give them £232 10s. of the new stock for each £100 of old.

The average dividend due to the "A" stockholders during the last ten years, as already mentioned, is £15 10s. 5d.; though the average actually received has only been £15 7s. per cent. The average dividend due to, and received by, the "B" stock has been £11 19s. 3d. If the figures now suggested are adopted, the dividends will be as follows: On the basis of a 2s. 6d. price and the equivalent of the present 13 per cent. dividend, which on the new stock would be at the rate of £5 4s. per cent., each £100 of "A" stock converted into £299 of new stock will receive £15 10s. 11¼d., and each £100 of "B" stock converted into £232 10s. of new stock will receive £12 1s. 9½d.

The signatories have no hesitation in recommending the "A" and "B" stockholders to assent to these terms of arrangement; being fully assured that they are the best for each side that can be obtained.

BRENTFORD GAS COMPANY.

The Half-Yearly Report and Accounts.

The working of the above-named Company in the six months ending Dec. 31 last has enabled the Directors (as already mentioned in the "JOURNAL") to recommend dividends at the rates of 5, 12, and 9 per cent. per annum on the three classes of stock. The statement of accounts to be presented at the meeting of shareholders next Friday shows that the sum available for the purpose is £66,720. In their report, the Directors say: "During the half year, the quinquennial valuation of the Company's property for the purposes of rating has been made in most of the parishes in the Company's district; and though the Directors have obtained very considerable abatements from the proposed gross rateable values, the result has been greatly to increase the amounts chargeable to rates and taxes. The Directors greatly regret this result, both in the interests of shareholders and consumers. They feel the amounts are still excessive, and must have an important tendency in preventing or deferring a decrease in price to the consumers. The very great expense necessarily attendant on appeals from these valuations has alone induced the Directors to accept the present assessments. The reserve fund, sanctioned at the last half-year's meeting, has been formed; the sum set apart having been invested in 2½ per cent. Metropolitan Consolidated Stock. The houses of inclined retorts at the Southall and Brentford works were completed during the half year, and are now in active and successful operation. The Directors view with great satisfaction the reduction in carbonizing wages caused thereby during the half year. The Directors have contracted for a reconstruction of No. 2 gasholder at the Brentford station. This holder is the oldest of the plant of the Company, and an additional lift is proposed to be added to it. The consumption of gas under the automatic meter system continues rapidly to increase. The continued depression in the markets for residual products, more particularly for coke and ammoniacal liquor, has caused the half-year's sales of residual products to compare very unfavourably with the corresponding period of 1894. It is hoped, however, that better prices may soon be obtained. The sale of gas during the half year shows an increase of 4·47 per cent. over the corresponding half of 1894. The plant of the Company is in excellent order."

Referring to the accounts, the sum of £14,655 was spent in the six months on new buildings and machinery, and additional mains, meters, and stoves; bringing the total capital expenditure up to £871,437, and leaving a balance of £15,583. The sum received for gas was £94,064; for meter and stove rentals, £5499; for residual products, £22,413; and for rents and transfer fees, £88—making a total of £122,064, as compared with £127,149 in the second half of 1894. On the expenditure side of the revenue account, the following items appear: Manufacture of gas, £66,677 (coals costing £43,010); distribution, £9517; public lamps, £1881; rent, rates, and taxes, £6277; and management, £4040. Miscellaneous items bring the total expenditure up to £89,472; leaving £32,592 to go to the profit and loss account, as compared with £43,861 in the corresponding half year. It is satisfactory, in view of the drop in residuals, to find a continued increase in the receipts for meter and stove rentals—this item being about £1000 more than in the six months ending Dec. 31, 1894. The quantity of coal carbonized in the period covered by the accounts was 65,006 tons; of cannel, 994 tons—together, 66,000 tons, as compared with 63,080 tons before. The bulk of gas made was 679,411,000 cubic feet, as against 639,191,000 cubic feet; and the estimated quantities of residuals were: Coke, 44,104 tons; breeze, 5460 tons; tar, 667,176 gallons; and ammoniacal liquor, 19,194 butts of 108 gallons.

Dorchester Gas-Fitting Company, Limited.—The working of this Company in the past twelve months resulted in a profit of £83; but with the balance standing over from the previous year, there is sufficient to pay, at the annual general meeting to-day, a dividend of 9d. per share (being equal to 11 per cent.), and leave £78 to be carried forward.

PROVINCIAL GAS AND WATER COMPANIES.

As usual about this time, reports are reaching us as to the working and financial position of the various Provincial Gas and Water Companies. We shall therefore, during the next few weeks, reproduce therefrom, under the above heading, such particulars as may be considered of interest to our general readers.

Gas Companies.

The half-yearly meeting of the Cambridge Gas Company was held on the 29th ult. The accounts permitted of the recommendation by the Directors of dividends of 10 and 7 per cent. The Manager (Mr. J. O. Weeks) reported that the amount received for gas had been equal to that of the corresponding period of the previous year. With reference to the works, he said he regretted to state that, owing to extensive excavations for the formation of new sewers, serious damage had been done to the gas mains and service-pipes, entailing much expense in repairs, and causing a considerable loss of gas. Commenting upon the reports, the Chairman (Mr. Dennis Adams) remarked that they had not earned quite enough in the half year to pay the full dividend; but the shareholders need not be alarmed at this. The weather had been against them; and they had incurred a large extra expenditure on account of the sewage works. Coke had not made such a good price; and ammoniacal liquor had also dropped considerably. The reports were adopted.

The Dorchester Gas and Coke Company, under Mr. Frank Osmond's management, had a further increase, to the extent of 560,800 cubic feet, in the consumption of gas in the six months ending Dec. 31, 1895. The revenue in that period was £3537; the expenditure, £2305; and the profit, £1232. The amount available for division at the general meeting to-day is £1183; and the Directors recommend the payment of dividends of 10 and 6 per cent. per annum, and the replacing of £150 to reserve fund, to make up for previous withdrawals.

The Grantham Gas Company's report for the past half year is a satisfactory one. It states that the consumption of gas has steadily increased; and as the demand is now beginning to tax the productive power of the works, the Directors have had to incur more outlay than usual upon them. The balance-sheet shows an amount in hand of £1955. Dividends of 5 per cent. on the old shares, and 3½ per cent. on the new shares are to be paid for the half year.

The annual general meeting of the Launceston Gas Company was held yesterday week—Dr. Thompson, the Chairman, presiding. The accounts were adopted; and it was decided to pay the usual dividend of 6s. per share—the balance being carried forward to meet an anticipated outlay on new and larger mains for the supply of the district of St. Stephen's. A report by the Manager (Mr. J. Treleaven) showed that the quantity of gas sent out in the past year was larger than in any previous similar period since the formation of the Company. The works generally were in an efficient condition.

The Malton Gas Company during the past half year had an increase of nearly 4½ per cent. in the sale of gas. The revenue account shows a profit of £1292; and, with bankers' interest, &c., added, there is a total of £2154 available for dividend and interest. A dividend of 5½ per cent. for the half year, free of income-tax, is recommended. The new valuation lists show a substantial increase in the assessment of the Company's property; the advance being from £563 to £952. This the Directors consider wholly unjustifiable; and they purpose appealing against it.

The report presented yesterday at the meeting of the Poole Gas and Coke Company stated that the profits in the six months ending in December were £1221 as against £1231 in the corresponding period of 1894. The Company made a reduction of 3d. per 1000 cubic feet in the price of gas supplied by meter; and this caused a difference of £146. It was, however, nearly compensated for by an increase of 5·43 per cent. in the consumption. Had it not been for an advance in the Company's assessment from £600 to £1100, and the great reduction in the value of sulphate of ammonia, the balance would have been more than that for the second half of 1894. There was a balance of £4668 in hand; and this enabled the Directors to recommend the payment of the maximum dividends (less income-tax) upon the "A" and "B" stocks and "C" preference shares.

The Directors of the Runcorn Gas Company report that the continued depression of trade in the town has had a prejudicial effect upon the consumption of gas. The revenue account shows a profit of £3715 for the past year; and in order to pay the interest on debentures and to meet the dividend of 10 per cent. which has been declared, it will be necessary to withdraw an amount from reserve. To provide for the rapidly increasing use of prepayment meters, to facilitate the disposal of residuals, and to maintain the increased stock of coal, it has been found expedient to reduce the sum invested in Consols by £1250, leaving £2283 in that security.

In view of the half-yearly general meeting of the Scarborough Gas Company next Saturday, the report and accounts for the six months ending Dec. 31 last have been issued. The former shows that the net revenue, with £948 brought forward, amounts to £7657, out of which, after providing the dividend on the preference stock, the payment of the maximum dividends (all less income-tax) is recommended. This will leave a balance of £2225, which is subject to a further charge of £1016 for the retort alterations suspense account; leaving a net balance of £1209. Owing to the unprecedentedly low price of sulphate of ammonia, the receipts from the sales of liquor fell off to the extent of more than 300 per cent. in the past six months. On the other hand, there was an increase in the consumption of gas for all purposes. To provide additional storage, a gasholder is to be constructed. Other alterations are to be made in the plant; and therefore the Directors have decided to raise such an amount of additional capital as will produce a sum of £15,000 during the current half year. An installation of regenerative furnaces was completed last autumn, and is now stated to be working satisfactorily. The works are under the supervision of Mr. J. Holliday, the Engineer and Secretary. The accounts show receipts amounting to £22,273; the expenditure being £15,090—coals costing £8391. The bulk of coal and cannel carbonized in the past six months was 12,327 tons; and the following were the quantities of residual products: Coke, 7396 tons; tar, 765 tons; ammoniacal liquor, 1299 tons. About 116 million cubic feet of gas were sold to private consumers, and about 11 million cubic feet for public lighting and under contract.

At the meeting of the Weymouth Gas Company next Thursday, the Directors will have the satisfaction of reporting that the sale of gas during the half year ending Dec. 31, 1895, exceeded that of the second half of the year 1894 by about 5½ per cent. Residuals have not made so good a return; but the sales in the fittings department have been much more extensive. Coal was cheaper; so that, notwithstanding the increased quantity used, the cost for the half year has been slightly less. The whole of the cost of the new gasholder, with the exception of a comparatively small amount, has been debited in the accounts—some to the capital account, and the remainder to the repair and maintenance of plant. The latter item, therefore, is considerably heavier than usual. The result of the half-year's trading has been a profit of £2025. This will admit of the payment of the fixed interest on the debenture bonds and also of the maximum dividends. The Directors will recommend accordingly.

The 103rd half-yearly general meeting of the York United Gas Company was held last Thursday—Mr. J. F. Taylor presiding. The Engineer and Secretary (Mr. C. Sellers) read the Directors' report. It stated that there was a total profit of £6387; but that this fell short, to the extent of £950, of the amount required for dividend and interest. This arose mainly from the further lowering of the price of gas, the reduction made last year in the price of coke, and the exceptional fall in the market value of sulphate of ammonia, which had reached the lowest level in its history. The consumption of gas for both lighting and fuel purposes, however, continued to grow in public favour; and in the half year covered by the report, it showed an increase of 5·17 per cent. over the corresponding half of 1894. The Chairman, in moving the adoption of the report, said the Directors fully anticipated the deficiency mentioned therein; and they were quite prepared to meet it. The reasons given were, he thought the proprietors would admit, sufficient to make a material difference in the past half-year's profits. However, the Directors looked forward to better prices being realized for sulphate in the immediate future; and the coal they would be using in the current six months would be cheaper than that which had been carbonized of late. He thought when they next met the proprietors, the present deficiency would be practically wiped out. Passing on to the subject of the electric light, he quoted Professor Lewes's opinion in regard to the superiority of the incandescent gas-light as an illuminant, and emphasized the fact that York gas, when employed with the best form of incandescent burner, would be found to be from twelve to fifteen times cheaper than the electric light at its present prevailing cost. He closed his remarks with an allusion to the value of gas as fuel for cooking and heating, for which purposes, like a good servant, he said it hardly needed a recommendation. It had got fast hold of the public favour; and it had come to stay. Mr. J. Pearson seconded the motion; and it was carried. A dividend after the rate of 5s. per share for the half year was then declared. The Lord Mayor of York (the Right Hon. C. A. Milward), in proposing a vote of thanks to the Chairman and Directors, said the views enunciated by Professor Lewes encouraged the hope that the incandescent gas-light would be a "thorn in the side" of the electric light for some years to come. Alderman Rymer seconded the motion, which was carried by acclamation; and the Chairman briefly acknowledged the compliment.

Water Companies.

The Cambridge Water Company have declared a dividend for the past half year at the rate of 10 per cent. per annum on the consolidated stock and of 7 per cent. on the amounts called up on the new shares. After paying these, there will remain undivided profits to the amount of £4621. The Engineer (Mr. W. W. Gray) reports that 178 premises have been connected to the Company's mains during the six months; making the total number 13,981.

The Directors of the Consett Water-Works Company are able to report a satisfactory increase of revenue in the past year. The extra cost thrown upon the Company by the exceptionally severe frost of last winter has added to the working expenses; but notwithstanding this, the net income is more than that of the preceding year. The total revenue for the year was £18,586; and the expenditure, £3854—giving a profit of £14,732. After deducting the interim dividend, interest on bonds, income-tax, and management expenses, there remained an undivided profit (including £1253 brought forward) of £8332, from which the Directors recommended the payment of a dividend of 4 per cent. per annum on the preference shares and of 6½ per cent. on the ordinary shares. These will absorb £5784; leaving £2548 to be carried forward. As to the works, filter-beds are in course of construction, and will be completed by the end of the present year, by which time the obligation placed on the Company by Parliament to supply filtered water for domestic purposes comes into force.

A most favourable report was submitted to the shareholders of the Grantham Water Company last Tuesday. It showed a balance on revenue account of £5636, of which £1750 is to be applied to the paying of a dividend of 5 per cent. for last half year—leaving £3886 to be carried forward. During the six months, more water was supplied than during any previous half year.

The revenue of the Mexborough Water Company has increased in the past year by close upon £100; and from an available balance of £630, a dividend of 5 per cent. has been declared. The arrangements for the sale of the undertaking to the Mexborough District Council having fallen through, and the population being an increasing one, the question of extending the plant will have to be considered.

The Directors of the York Water Company reported, at their half-yearly general meeting last Thursday, that there was a continued increase in the water-rents in the six months ending in December. They amounted to £9105. The balance in hand was £7728; and the Directors recommended a dividend of 5s. per share on the preference shares, and one of 7s. per share on the new shares, 1878 and 1879, for the past half year. To meet the extended demand for water, an additional pumping-engine, with other plant, is to be proceeded with; and further capital is to be raised to defray the expenses. The report was unanimously adopted.

CHESTERFIELD GAS AND WATER WORKS ARBITRATION.

Surveyors' Institution, Westminster—Wednesday, Feb. 5.

(*Before Sir* GEORGE B. BRUCE, *Umpire.*)

The proceedings in the arbitration between the Chesterfield Water and Gas Company and the Chesterfield Gas and Water Board, to determine the amount to be paid for the Company's undertaking, were opened to-day. Sir F. BRAMWELL, F.R.S., representing the Company, and Mr. CORBET WOODALL, M.Inst.C.E., the Board, sat with the Umpire as Referees.

Mr. C. A. CRIPPS, Q.C., M.P., Mr. R. M. BRAY, and Mr. A. J. RAM appeared on behalf of the Chesterfield Water and Gas Company; while Mr. R. D. M. LITTLER, C.B., Q.C., and Mr. J. D. FITZGERALD, Q.C., represented the Gas and Water Board.

Before proceeding, Counsel on both sides, and the Umpire also, made allusion in feeling terms to the fatal accident which, as mentioned in the "JOURNAL" last week, had recently occurred to Mr. Bidder, Q.C., who had been retained as leading Counsel for the Company.

Mr. CRIPPS then opened the case for the Company; premising his remarks with the statement that he should treat the gas and the water portions of the undertaking as one in his speech, but that he proposed to keep them separate in the evidence. The arbitration was as to the price to be paid by the Chesterfield Gas and Water Board for the compulsory purchase of the Gas and Water Company. No new principle was involved, so far as he knew, though there might be some conflict of opinion as to the application of those principles. In the view of the Company, the purchase was a compulsory one—that is to say, a purchase from an unwilling vendor, though the vendor had to assent to the terms of purchase imposed by Parliament. In 1894, the Company promoted a Bill in Parliament, by which they sought power to raise and expend fresh money, in order to extend their limits of supply, as they were then drawing to the full from their present sources. The Chesterfield Corporation opposed the Bill, on the ground that fresh powers should not be given, but that the undertaking should be transferred to the local authorities; and it was rejected, on an undertaking being given on behalf of the Corporation that they would bring in a Bill to take over the whole business of the Company, paying a "fair and reasonable" price. In laying down what would be a "fair and reasonable" price, he would adopt principles which Mr. Littler had enunciated. When before the Parliamentary Committee, Mr. Littler stated that the Company would get their full value on being taken over, because in all compulsory sales the principle was full value—something for compulsory sale, something for the value of the concern, and something for prospective future profits. The Chairman of the Parliamentary Committee, in announcing that they held the preamble of the Bill not proved, said they were of opinion that the supply of water and gas should be undertaken by the Corporation, in accordance with the pledge given by Mr. Littler.

Mr. LITTLER denied that he had given such a pledge.

Mr. CRIPPS, continuing, said in 1895 the Corporation introduced a Bill into the House of Lords, by which the terms to be paid for the undertaking were to be determined under the Public Health Act—nothing was to be added for compulsory purchase. Discussion subsequently arose as to whether the sale was to be regarded as compulsory. In the end, the Lands Clauses Act was incorporated in the Act; and the point as to compulsion was ignored. But whereas under the Public Health Act it was not customary in arbitrations to make any allowance for compulsory purchase, in arbitrations under the Lands Clauses Act such allowance was always made. The learned Counsel quoted a number of passages from remarks of the late Mr. Bidder and Mr. Littler in support of his contention that allowance should be made on this head; and he pointed out that this was an important matter, as the claim, in round figures, amounted to £400,000. Supposing the Company were left with this sum, they would have to consider the question of re-investment, temporary loss of interest, and whether they could get a return for the money which would be equal to what they were now receiving; because there was great difficulty in finding alternative investments for large sums of this kind. The real object of the 10 per cent. customarily allowed for compulsory purchase was that, although a reasonable indemnity might be given for a concern, it was felt some allowance should also be made for the trouble and risk of re-investing. It was entirely for the Court to decide whether the 10 per cent. should be given; and he urged that it should, because it could not be denied that this was a case of compulsory purchase—clause 20 of the Local Act of 1895 enacting that "the Company shall sell." The Act further stated that all the Company's rights and privileges should be taken over by the Board on the date of the transfer, but that all matters up to then should be in the hands of the Company; and in another part, it was provided that, although the whole value of the undertaking was to be decided, the Arbitrator was to state what portion of the money was awarded on account of the gas, and what portion on account of the water part of the property. The Board were, however, to pay the costs incident to the winding up of the Company. As he understood section 24, the Company would be entitled to all income, and have to pay all outgoings incident to the carrying on of the business up to that time, though allowances would have to be made—for instance, in the case of any gas-rate paid in advance, or if the Board entered upon possession in the middle of a quarter. As regarded the loose stock, there would have to be a valuation in order to effect a fair adjustment. He did not expect any difficulty in this connection; but he thought it well to mention what he supposed the conditions would be.

Mr. LITTLER remarked that, if the stock were tenant's stock, it should be allowed for; but if it was landlord's stock, it would be included in the purchase.

Mr. CRIPPS assented. Continuing, he stated that the Company was formed in 1825; but for the purposes of this arbitration, he should take the year ending Sept. 31, 1894, as the accounts for that year were the last published. On that date, £51,820 ordinary shares remained to be issued; and part of the claim was based on this sum. Under the Companies Act of 1863, the Company were entitled to issue this capital at par to the existing shareholders; and there were no auction clauses in the Local Act to prevent this being done. That would only be a paper advantage, unless there was an increase of revenue to correspond. But if it could be issued so as to maintain or increase the present dividend, it would be a direct advantage. So far as the water part of the undertaking went, no advantage could be derived in this way, because their resources were being utilized to the full; and expenditure would have to take place at once, without any large increase of revenue, for some time at least. As regarded the gas portion, looking to the conditions of the works and to the estimated results, it was calculated that more than a proportionate advantage would arise from the utilization of the surplus capital. Therefore, in estimating the value of the gas undertaking, he held that a very considerable sum would have to be added in respect of what the Company would certainly have now been receiving had they been allowed to issue this new capital for the improvement of the gas-works. As to the loan capital, £13,500 had actually been borrowed, and £47,250 remained. Some allowance would have to be made on this account, inasmuch as the money yet to be borrowed would be productive if expended on the gas account. The Company had power to pay varying dividends; and in the aggregate these amounted to £10,989 1s. 6d.—this being the sum which would be the maximum applicable to capital raised and being utilized. If the Company had always paid maximum dividends, there would be little difficulty; but that was not the case. Up to 1878, maximum dividends were paid, either year by year or subsequently; but from that time, some £7000 of back dividends had accrued in connection with the 10 per cent. stock. They had power to pay back dividends in addition to the 10 per cent. in any year; and as the Company were advised that they would be able in a few years to pay up these dividends on the gas portion of the stock, the amount of them was included in the claim. In the 1894 account, £89,852 of capital was allocated to water and £92,446 to gas; and these were the proportions in which the sum available for dividend was separated. In 1894, £9938 17s. 8½d. was carried to profit and loss account; but this ought not to be taken as a proper test of the financial position of the Company in regard to revenue, because, under the head of rates and taxes, there was £1396 for water and £1785 for gas—figures which were almost unique. They worked out at something like 15 per cent. on the gross revenue, or 7·3d. per 1000 cubic feet of gas. He doubted whether it was found at 3 per cent. even in a railway company.

Mr. LITTLER: I am told your figures include income-tax.

Mr. CRIPPS: Well, if they do, it would account for very little of it. In the cases of other companies, the corresponding figures worked out at 1·2d. per 1000 feet of gas. If this sum were reduced at all reasonably, it would allow of the maximum dividend being paid. In connection with the unissued capital and the security of the present income, it was necessary to consider what the prospects were; and in this respect at least—owing to the Manchester, Sheffield, and Lincolnshire, the Midland, and the Lancashire, Derbyshire, and East Coast Railways being there, and to other circumstances—Chesterfield was making substantial advances. Nothing was claimed for prospective income—only on present income, and the prospective value of the unissued capital. As regarded the important question of the number of years' purchase, Counsel emphasized the fact that the improvement in the value of securities generally had been an advantage in purchases of this kind, because, not only had money gone up in value, but it was especially marked in the admirable terms on which it could be raised by corporations for such purposes. What the Corporation would do here, would be to provide a certain income on the 3 per cent. table, while able to raise it at a reduced rate; thus securing the advantage of the difference. In this case, the Company capitalized the gas part of the undertaking on the 3½ per cent. table, or 28·57 years' purchase; and the water part, on the 3 per cent. basis, which worked out at 33·3 years. On this basis, the Corporation would probably be able to gain by raising money on easier terms. The number of houses supplied with water by the Company was 9248; and the rate was exceptionally low—so low, in fact, that in the 1894 Bill the Company sought power to increase it. As to the condition of the gas and water works generally, they had the advantage of seeing the report of Mr. Corbet Woodall, one of the Referees, and Mr. W. B. Bryan on the matter. From this report, it appeared that, according to Mr. Charles Hawksley's evidence before the Select Committee of the House of Commons, the drainage area of the Upper Linacre reservoir was 920 acres, and that of the Lower Linacre reservoir 413 acres—or a total of 1333 acres. The joint storage capacity of the two reservoirs was 150 million gallons; and the available supply of water was 800,000 gallons per diem. The Upper and Lower Linacre storage reservoirs appeared to have been constructed in a most substantial manner; and the whole of the channels, weirs, outlets, tunnels, &c., were of first-class workmanship, and had been well maintained. The Club Mill service reservoir was also a substantial piece of work. The Company produced a schedule of the different sizes and lengths of mains used for distributing the water; and these were assumed to be sufficient for the purposes for which they were constructed. The population actually supplied was 46,000; and the quantity of water available was 800,000 gallons per day—an allowance of only 17·4 gallons per head. Messrs. Woodall and Bryan, however, thought 25 gallons per head per day ought to be available. In 1893 and 1894, the Company were in great difficulties, owing to the shortness of water; both these years being abnormal as regards the absence of rain. But, it was further pointed out in the report that even 800,000 gallons a day was not sufficient for the needs of 46,000 persons—particularly when it was considered that an additional quantity was required for trade, road watering, &c. There was, therefore, no margin for future increase of population; and if such increase should take place, new works must be undertaken. The cost of these, should the water-works be then the property of the Corporation, would fall upon the district of supply; and there was no doubt that for years sufficient revenue would not be produced to pay the cost. In these circumstances, Messrs. Woodall and Bryan did not recommend that any sum should be paid, if a purchase were effected, for prospective value or compulsory purchase of the existing works. The only point, Mr. Cripps proceeded to remark, on which he differed from this report was,

as he had stated, on the question of compensation for compulsory purchase. The claim for this portion of the business was rather less than £200,000. Counsel then read the report of Messrs. Woodall and Bryan in reference to the gas section, which, like the water report, was made at the instance of the Chesterfield Town Council. The report stated that the low rate at which local authorities could raise money, as compared with companies, gave them great advantages; while, under their control, the cost of management would be reduced by the saving of various fees and the concentration of the staff. Another advantage was that the undivided control of the streets would thereby be vested in one body. If profit was to accrue to the town by the transfer, it must arise either from an increased demand or from reduced cost of manufacture. Although during the past ten years the growth had been only 2 per cent. per annum, they thought a better rate of increase might be looked for by pushing the use of gas for heating and cooking, and by the employment of prepayment meters, enabling the poor to pay for gas as they consumed it. As to the possible competition from electric lighting, Messrs. Woodall and Bryan knew of no town even approximating to the size of Chesterfield where the light had been introduced with success. If a demand arose, the Corporation would almost certainly find the most economical mode of dealing with it would be by gas-engines. It was possible, therefore, that such a demand might increase the consumption of gas; while it was very unlikely that it would reduce it. In the new works, they thought the wages could be reduced somewhat, and the cost of fuel considerably. The value of the undertaking would be determined on the basis of profit earned and maintainable—assuming that the works, plant, and mains needed no immediate outlay. The works consisted of two sections, which adjoined each other. One—the "new" one—had had no gas made in it yet, though it was constructed 20 years ago. Part of the new works, especially the purifiers, had been in profitable use for years; but otherwise the expenditure on them had been a grievous burden on the Company. The dividends upon the ordinary stock were reduced to one-half of what they were prior to the erection of this building; and there had been no reduction in the price of gas for ten years past. The capital was invested in works that were too large for the business done; and it should be reduced. When the manufacture was transferred to the newer premises—and the sooner that occurred the better—the value of the abandoned works should be written off out of profits earned. The profit during the past three years had averaged £4540; but the expenditure on repairs appeared to have been less than would be shown if a longer period were taken. Commenting on this report, Mr. Cripps pointed out that, as the works were larger than required, subsequent increase of business would be accompanied by a smaller proportionate additional cost, which meant greater profit. As regarded the outlay on repairs, in the 1894 account, which would be placed before the Court, an additional allowance of some £400 was made under this head. Generally, he could accept all that was in the report, save as regarded the question of reduction of capital, because for the purpose of these proceedings the capital was of little consequence—the chief thing being what the annual income was. On account of the gas section, the claim was for about £220,000. In conclusion, he said that, so far as water was concerned, the claim was capitalized revenue; and so far as gas was concerned, it was for capitalized revenue *plus* prospective value both as regarded the amount due as to back dividends and the value of the unissued capital. Then on the amount of the claim under the two heads, they claimed 10 per cent. for compulsory sale—no doubt compulsory—in fact, recognized as compulsory under the clauses of the Lands Clauses Act, and inserted in the Chesterfield Gas and Water Act of 1895.

Mr. *W. Brining*, examined by Mr. BRAY, said he was a chartered accountant of Sheffield and Chesterfield; and that he practised in those towns as Short and Co. Since 1869, his firm had acted as accountants to the Chesterfield Water and Gas Company. He had been through the accounts; and with the exception of one item of £86 12s. 6d., for relaying water-mains at Brimington in 1894, everything had been charged under its proper head. In 1894, the net revenue for water was £5060 7s. 10d.; the gross receipts being £8058 13s. 10d., and the expenses £2998 6s. The gross earnings on gas account in 1894 were £12,451 17s. 4d.; and the expenditure, £7660—leaving a net profit of £4791 17s. 4d. The rates and taxes on the water section were £1396, and on the gas section £1785; and deducting the income-tax in both cases, the figures were £1236 and £1625 respectively. In 1879, the gross rateable value of the whole undertaking was £3858; the net rateable value, £3215; and the total amount paid for rates, £609 17s., or 3·2 per cent. of the total gross receipts. In 1894, the figures were respectively £9966 1s. 3d., £7972 17s., and £2861 6s. 6d.; the latter figure being nearly 14 per cent. of the gross earnings, or equivalent to a dividend of 1·7 per cent. on the share capital of the Company. The receipts on account of water for 1890 were £7108; 1891, £7206; 1892, £7583; 1893, £7880; and 1894, £8058. From 1890 to 1894, there was an increase of 15 per cent. The sale of gas also had slightly increased.

Cross-examined: There was no place in the county of Derby where the charge for gas was as high as in Chesterfield. He could not say what would be a fair average increase in the sale of gas or water. Between 1893 and 1894, the increase in the sale of gas, on a total receipt of £8400, was 2 per cent. Since 1890, there had been a large decrease in the gas consumers, owing to the use of electric light; but witness could not say that the electric light was used because they could not get sufficient pressure from the gas-mains. Since 1890 the rent of meters had been almost stationary; but there had been a slight decrease. He knew the Company had appealed against their assessment; but he did not think the appeal was prosecuted to Quarter Sessions. Since 1879, the rates in Chesterfield had risen from 3s. 10d. to over 8s. in the pound.

Mr. LITTLER: Do you know that in London the Water Companies pay over 10 per cent. of their gross earnings?

Witness: I do not know anything about it. Continuing, he said that, in examining the accounts, he had seen, as far as any accountant could, that the various items had been properly charged, and that vouchers and bills placed before him had related to actual goods bought or work done.

Mr. LITTLER intimated that he should seriously challenge the Company on this score.

Witness, continuing, said he had had the invoices, and had gone into subsidiary accounts to verify them; but he had not visited streets to see, for instance, that pipes were being removed.

Re-examined: In 1879, in the borough of Chesterfield alone, the rates were 6s. in the pound. He had not the amount of the rates for the district of the Company outside Chesterfield. In the 1894 account, £398 was entered as the amount of ammoniacal liquor sold. If, as had been stated by Mr. Lass, £298 worth was sold, £100 would be the value of the stock in hand.

Mr. *E. Mitchell*, estate agent and chartered accountant, of Chesterfield, said he had been Shareholders' Auditor of the Company for many years. He was agent for 850 houses and business tenements in, and many more outside, the borough. Chesterfield had grown very rapidly during the last few years, owing to new estates being laid out for building. At present, he had only one house to let. Owing to the presence of the several lines of railway, and the general growth of the town, he should say that in the next five years there would be a large increase in the demand for gas and water.

Cross-examined: Very few of his tenants were navvies. When the railways were being built, there was a large influx of them; but many had left now, and of those who remained a great number lived outside the town. Since 1892, 270 houses had been built on his estate. He thought the growth of 100 houses a year rapid for a place like Chesterfield. He could not say if there had been an increase in the consumption of gas proportionate to the number of houses. He did not know that a great deal of electric light had been installed. Messrs. Robinson and Sons had the electric light; but he could not say they started it because they were not able to get sufficient pressure from the gas-mains. He knew nothing of a man being only able to get a flicker of gas. He had always had good lights, and so had everyone in his neighbourhood. The names of a number of firms were put to him as having given up gas for electricity; but he said that in each case they had spare engine power, which they utilized in producing the electricity. It was not a common saying in Chesterfield, that you had to light a candle to see whether the gas was alight. As regarded the water, he considered there was not a better supply in England. He had had experience of getting a water supply in closets. He had had no serious trouble with the water, except for a time last summer when there was so little rain. He did not approve of water-closets; he much preferred earth closets, or muck pans. The sanitary authority had tried to make the Water Company supply water to the closets; but he strongly opposed it. Witness recollected several times when the supply had run short. Wherever there was a water supply, there were fishes in the water; but he had never seen frogs' legs and fishes' tails come through the water-pipes at Chesterfield.

A number of photographs were produced and handed to the Umpire, showing the condition of the reservoirs at different periods of scarcity of water.

Mr. *J. W. Fern*, architect, surveyor, and mining engineer, said he had practised in Chesterfield for 40 years. He acted as agent for the owners of many of the mineral properties in the neighbourhood. The population was increasing largely; and in the last few years, there had been considerable additions to the dwelling-houses and trading establishments. At one works recently established, over 400 men were employed. The development of the railways was causing the mining industry to enlarge very rapidly.

Cross-examined: The new mining pits were 9 miles to the east of Chesterfield; but many of the miners lived in the town, travelling to and fro daily. It was true that the East Coast line through the town had been to a large extent abandoned. Miners consumed gas, but not largely.

Thursday, Feb. 6.

At the opening of the sitting this morning,

Mr. LITTLER said he should like to make a statement, though he would not ask for an answer to it at once. It was in reference to the gas portion of the undertaking. The Corporation never did want the gas-works; and they did not require them now. If, therefore, his friend Mr. Cripps desired to keep them, he might. He did not ask his learned friend to say he would or would not take the works just now; but even if they were as profitable as it was said they were, the Corporation, who had very heavy responsibilities—the total rating being 8s. 4d. in the pound—were quite content that the Company should keep them. It was a misapprehension to say that the Corporation asked to be allowed to purchase the gas portion of the undertaking.

The UMPIRE inquired if the Act under which the arbitration was entered into covered the gas as well as the water portion of the case?

Mr. LITTLER: Well, if my friend Mr. Cripps insists on it, we shall have to buy. If we both agree, however, it is different.

Mr. CRIPPS said the suggestion made by Mr. Littler was an important one at this time; and the Company would consider it. But both from the Act and in the circumstances of the case, he thought the proposed arrangement was impossible.

Mr. LITTLER: I do not ask you to give an answer now.

At a later period of the inquiry,

Mr. CRIPPS said that, as regarded his learned friend's offer, he (Mr. Cripps) had been instructed to refuse it, on two grounds. He thought it would be impossible to proceed legally with the arbitration if they agreed to such terms; and furthermore the Company stood on their rights for the sale, not of a portion of their undertaking, but of the whole.

Mr. *A. W. Byron*, land agent, said he had resided in Chesterfield for 16 years. It was quite clear to anyone who knew the place that Chesterfield was growing largely at the present time, and must increase in the next few years in a way it had never had a chance of doing before. The new railway—the Lancashire, Derbyshire, and East Coast Railway—and the new works which it would draw, would bring the increased population. Hitherto it had only been a mining town; but in the future they would, no doubt, have an educated artizan population added. With regard to the new railway, it was not merely a little mineral line, but a double road; the central section extending from Chesterfield to Lincoln. The Company were going to

move all their offices to Chesterfield, which would be the headquarters of the railway. The station to be erected there would be a commodious and large one; and there would be a hotel adjoining. This was all to be done within the next year. The line was very nearly finished; the stations were in course of construction throughout the central section; and the Company would shortly be moving their servants to Chesterfield. Then, a lot of poor property had been done away with; and a site had been provided for better houses.

Mr. CRIPPS: You purchased 15 acres of land for Mr. Clench?

Witness: Yes; Mr. Clench came a few years ago, and consulted a friend and myself as to building engineering works. He is just an instance of what will take place in Chesterfield pretty generally. He came because of the new railway accommodation; and he will have 11 acres of land covered by his new works before long. As soon as his works are open, they will require 300 or 400 men; but there will be employment for 1000 eventually. In Chesterfield there are an enormous number of new houses. Between 1881 and 1891, the town was stagnant. There was, I believe, almost a decrease in the number of houses; but now about 200 houses are being built per year. A great change is coming over the district, owing to the development of the place by these new lines; and it will be more rapid still when the railway is opened, and Mr. Clench is at work. The Railway Company will build between 40 and 50 houses for artizans' dwellings.

In cross-examination by Mr. LITTLER, witness said he was still a Director of the Gas Company; and he thought there might be a great future before it.

Mr. LITTLER: If it is legally possible, I suppose you would like to keep the undertaking?

Witness: I have great faith in the Corporation.

If only moderate terms are offered, you would like to keep the works?—It is not for me to say. Personally, I regard my own stock as a good property. Witness went on to say that, not being an expert, he was unable to state whether 4s. per 1000 feet was a fair price to charge for gas. He was aware that in many quarters the Corporation had been urged once more to try the electric light. That system had formed the subject of experiment already; but it had proved a ghastly failure. Since 1894, no doubt there had been many proposals made for the adoption of electricity.

Mr. *Charles Hawksley*, examined by Mr. CRIPPS, said that he had a thorough knowledge of the circumstances of the town and neighbourhood of Chesterfield; having been acquainted with them for 40 years, and having been consulted by the Corporation with regard to water supply. He explained the situation and character of the existing water-works (which he had studied, in order to arrive at a proper basis of compensation for their acquisition), and proceeded to point out that the storage reservoirs derived their supply from 1333 acres of land. The available rainfall was 11 inches. The present works were sufficient for a population of 46,029, allowing 18 gallons per head; but in 1894, a population of 47,600 were supplied. The works, therefore, were scarcely sufficient to supply the people—that was, estimating on the basis of three consecutive dry years. The water-works had been well maintained, and were substantial; and there was no reason to believe that anything would prevent their being utilized for a long series of years for water supply purposes. In 1883, his firm were consulted as to the best mode of increasing the supply of water; and a scheme was prepared for which parliamentary powers were sought in 1894. That scheme was not sanctioned by the Parliamentary Committee; a pledge being given by the Corporation that, if the Committee would reject the application, they would introduce a Bill for the purchase of the undertaking, and for the construction of additional water-works. A good many of the statistics given in 1894 had reference to the new supply which was then asked for. As to the compensation figures, he had taken the accounts for the year 1894 as a basis for arriving at the initial amount. The expenditure on water was £2911 odd; and the income, £5147, from which small deductions had to be made on account of rating, and so forth. He considered the rates on the water-works 50 per cent. too high.

Mr. LITTLER took exception to this evidence, holding that the question of rating was not a matter with which the Umpire could deal. The rates were in existence; and if they were wrong in amount, they should be appealed against in the ordinary way.

The UMPIRE held that the evidence was admissible.

Witness (proceeding) said that, making the necessary deductions and regarding the supply as a maintainable one, he considered the water-works could only supply 46,529 people. Their income of £5352 was derived from a supply of 47,590 people. Therefore the £5352 should be reduced into the proportion of 47,590 to 46,529, on the basis that they were asking for an income which applied for all time to the population. The number of years' purchase which ought to be applied to these water-works was 33⅓, which represented 3 per cent. interest on capital. The shareholders would have to reinvest their money; and more than 3 per cent. could not be obtained on security as good as these works. He considered 33⅓ years' purchase a fair amount, having regard to the condition of the money market, and the price which had been given for similar water undertakings recently. No claim was made for prospective value, owing to the failure of the scheme of 1894 in Parliament. Supposing the compulsory principle had to be applied in this case, he did not think that 10 per cent. was too much to charge in respect of it—it was a very proper allowance. Multiplying the water income of the Company by the proposed number of years' purchase, and adding the 10 per cent., the figure came to £189,786.

Cross-examined by Mr. LITTLER, witness said that in regard to water supply, the Company might have got beyond the end of their tether—as he had said they had got beyond their maintainable supply. He considered that 18 gallons per head was sufficient in Chesterfield. He had put it at 20 gallons before the Select Committee, that being a figure which was frequently used in Parliament. There would be every prospect of the supply per head increasing in Chesterfield, if it were intended to put water-closets into the town; but he had heard it stated that this was not in contemplation. Even if water-closets were adopted, 20 gallons per head would not be absolutely necessary. Less than 18 gallons were used in some towns possessing water-closets. The proposal for 20 gallons was made in 1894, to avoid needless discussion; that being a well understood figure. In 1894, the Company might have said that they could not raise any money in view of the rates they were then charging. They sought power to raise their rates; but the Bill they promoted was thrown out as a whole, and not because of the clauses bearing upon this question. He had no doubt that, if the Company had obtained power to construct new works, they would also have got permission to raise their rates. The opposition to the measure, to his mind, was not so much on the ground of the proposed rise in the rates, but because the Corporation themselves wished to become possessed of the undertaking.

Mr. LITTLER said that his view, on the contrary, was that the Corporation would not have objected to the construction of new works, if it had not been proposed to raise the rates. The Corporation at present had quite enough to do with their money.

Witness (continuing) said that 74 per cent. of the houses in Chesterfield were under £10 valuation, while in the district the lowest percentage was 91. In Chesterfield, they had no regulations to prevent waste of water, though he thought the Company had power to make and enforce such regulations.

Mr. LITTLER understood the Company had applied to the Local Government Board to sanction regulations; but they had refused.

Witness replied that the Local Government Board were very obstructive in regard to regulations. In one instance, the Board had had an application under consideration for more than a year; and the matter could not be got out of their hands.

Mr. LITTLER remarked that he was aware of a case in which an application had been before the Board for twelve years without being decided.

Witness said he knew nothing about an application for confirmation of water regulations having been made by the Chesterfield Company. He admitted that without power to raise the water charges, the Company would have experienced considerable difficulty in obtaining new capital.

Mr. LITTLER: If anyone went to the Local Government Board, and said you were unable to supply the water required, you would be obliged to say that was so?

Witness: Certainly.

Did you ever hear of giving people 33 years' purchase on such conditions?—You must look at the circumstances of the case. We should not be made sufferers because of the intervention of intending purchasers.

Do you agree that Chesterfield is face to face with urgent need for water?—Well, the Company, if they are to do their duty to the consumers, must have power to increase the supply. At present, they are unable, strictly, to fulfil these duties.

In further cross-examination, witness said if Parliament accepted their scheme for increasing their works, he thought they would allow them to raise the charges, notwithstanding what had taken place in Parliament in 1894. He admitted that the water supplied in Chesterfield was sometimes discoloured. The flood water entered the upper reservoir, which did not possess a bye-channel to carry away the water. The gathering-ground of the water was highly cultivated. He was informed that the service reservoir was sometimes filled to its utmost capacity; but he could not give evidence as to the soundness of the reservoir.

Mr. LITTLER: Is it not rather a new departure to value water-works undertakings at 33 years' purchase?

Witness: No. I put it at that in a case in which I was advising the purchasers some two years ago. Twenty-five years' purchase was taken when money was at 4 per cent.; and I wish it was at that now. Previous to that—many years ago—money was at 5 per cent.; and these undertakings were sold at a smaller number of years' purchase.

In re-examination, witness said the claim the Company were now making was based on existing charges—on profits actually made, and on the failure to get what was asked for in 1894, with the sole correction that had been made with respect to the rating. He considered 18 gallons per head per diem ample for the population of Chesterfield; the town possessing a large average of small houses. There were many larger places, to which the water supply was less. He had never heard the quality of the water questioned; but only the day before, a gentleman who represented a large amount of property in the town had told him that he considered the water exceedingly good.

Mr. CORBET WOODALL: There are many large towns which have a less supply of water than 18 gallons per head per day—making exception, of course, for trade consumption?

Witness: Yes.

How much would you allow for trade consumption?—At Stockton, for instance, the trade consumption is 40 gallons per head per diem.

In regard to Chesterfield, we have no evidence of what the trade consumption is?—We are told that it is about 1½ gallons per head per day. The 18 gallons which are allowed in the case of Chesterfield includes a large margin for trade requirements. For other than trade purposes, including waste, a larger supply than from 12 to 14 gallons ought not to be necessary.

Are the conditions of the Chesterfield water supply such as to enable the Company to realize the largest possible amount of profit; the Company working to the utmost of their ability, and doing everything at their best?—In 1894, the Company realized a larger profit than I think they were entitled to on the capabilities of the present system; hence the deductions I have referred to of about £6000 in respect of the present works to maintain their income during a long drought.

That payment was on account of population in excess of what you say the works are equal to?—Owing to the rainfalls in that year, the Company were able to supply the water; but had it so happened that there had been last year a long period of drought, they would not have been able to maintain a constant supply.

Putting that aside, as the works were fully occupied for the population, were not the conditions under which the capital was invested in the undertaking such as to realize for the Company the utmost amount of profit?—Certainly.

Is it fair to take the year 1894 alone as the basis upon which to calculate?—Yes; in valuing for the purchase of the undertaking, it is always customary to take the amount of profit actually earned at the time of the valuation, and then to add to that any surplus capabilities there may be.

Though in this case there were deductions to be made?—Yes, for deficiencies.

Sir F. BRAMWELL: In the case of a constant supply to houses of £10 and under, are the usual provisions made with regard to water? How many taps are there?

Witness: In the small houses, there is frequently only one tap.

Any cistern?—No, not as a rule.

So that the cause of waste in houses of that kind is simply misuse of the tap?—Yes.

Mr. *Henry Rofe*, M.Inst.C.E., examined by Mr. RAM, said he had had an opportunity of gathering information as to the amount of water supplied to a number of large places in Yorkshire and elsewhere; and he was also acquainted with the conditions of supply in Chesterfield. He was familar with one case in which water was supplied by meter; and 821,000 gallons were distributed in this way each day to 67,500 persons.

Sir F. BRAMWELL: Do I understand that these people buy their water by meter?

Witness: No; but the water passes through the meter, which is the only way we have of ascertaining the actual amount used. The water is sold to the sanitary authority and distributed by them; and I am giving you the figures which that authority has obtained as to the water supplied. The total amount consumed per head is 12·7 gallons. I do not know of any single case in which there is such a large consumption which can be measured by meter.

I gather from this that 18 gallons per head in the case of Chesterfield would be quite ample?—One and a half gallons per head is all that I should think of allowing for trade purposes. I agree with the figures of Mr. Hawksley, as to the purchase-money and the additional 10 per cent. for compulsory sale.

In cross-examination by Mr. FITZGERALD, witness said that in 1893 the Company found themselves unable to supply the necessary amount of water; the result being that a large portion of the district was suffering from water famine.

Mr. FITZGERALD: Have you ascertained the population which was then supplied by the Company?

Witness: The population is mentioned in the statistics which have already been given.

No; the statistics had reference to 1894; and as it turns out, the population supplied in 1893 was a little over 46,000, or the calculations are wrong?—No.

The population must have been in excess of 46,000, or the 18 gallons was not sufficient?—If the population was less, they would have been using more than 18 gallons per head.

To make such a considerable difference as there was in 1893, there must have been a larger population supplied if your figures as to the 18 gallons per head are correct?—I do not know that.

It was not the ordinary case of only giving water for a certain number of hours per day, but whole districts were left without water for a period of six weeks at a time?—That is so; but I think that the non-supply to the district was due as much to want of pressure as to shortness of water. The great fact remains, that in 1894 these works were capable of supplying 46,000 people with 18 gallons of water per head per diem.

In further cross-examination, witness said that 75 per cent. of the houses in Chesterfield were under £10 rental; and 10 gallons of water would be ample in cases of this kind. No doubt, some towns in the country—such as Brighton, Blackburn, Bradford, and so forth—required a large amount of water per head per day. Chesterfield, which was not a town of this kind, could not be compared with places like these. It was true that Parliament had refused to assent to the claim of the Company in 1894; but it was also equally true that they were prepared to give the Corporation power to do precisely what the Company wished for authority to carry out.

Mr. FITZGERALD: The whole basis of your calculation is that an allowance is to be made for the fact that, if the Company have any extension in view, they will have to go to Parliament to obtain powers to raise £100,000?

Witness: I have ignored that altogether. The Corporation say we shall not go to Parliament, therefore we cannot go.

Mr. *James Mansergh*, M.Inst.C.E., who was the next witness called, said he was acquainted with the Chesterfield Water-Works; and, so far as he could see, they were in a good sound condition. He had known another case—that of Stockton and Middlesbrough—in which the Water Company were at the end of their tether; and Parliament refused to give new powers. He had that and other similar instances in his mind. He was familiar with the case referred to by the last witness, in which water was supplied by meter, and was of opinion, from that precedent, and from experience in other places, that 18 gallons of water per head per day would be ample for the population of Chesterfield. With regard to the position of the money market, he had made inquiries, and found that an undertaking of this kind would have fetched 25·73 years' purchase in 1878; and with that estimate, the present market price would be 36·95 years.

Mr. LITTLER objected to this evidence; holding that the point put by witness was purely a matter of opinion, and that he (the learned Counsel) might be able to hand in the statement of a City financier, which would put a very different complexion on the matter.

In answer to Mr. WOODALL, witness said he considered the conditions of the water undertaking such as to enable the Company to earn the maximum profit.

Mr. *G. J. Symons*, F.R.S., Secretary to the Royal Meteorological Society, gave evidence as to the amount of rainfall in the gathering-ground in the Chesterfield district.

Mr. *H. E. Jones*, M.Inst.C.E., of the Commercial Gas Company, examined by Mr. CRIPPS, said he had made himself familiar with the circumstances of the gas undertaking of the Chesterfield Company, with a view to this arbitration. He had found that the sale of gas in 1894 was 53,245,000 cubic feet; and the receipts, with residuals—the prices charged being 3s. 3d. and 4s.—£12,452. The cost of manufacture was £7660, which left £4952 profit, including income-tax. The maximum dividends, including charges for borrowed money, amounted to £6040, or a deficit as between profit and maximum dividend of £1088. This deficit could be more than made up by sundry equitable readjustments. For instance, while the amount spent on repairs was insufficient, a considerable saving should be effected on rates and taxes, which were abnormally heavy. Any honest endeavour to get them reduced could not fail of success. The rates worked out at 7·3d. per £1000 cubic feet of gas sold, or four times as much as they ought to be.

Mr. CRIPPS: From your knowledge of these matters, what should the rates be?

Witness: There may be exceptions in the case of small companies, which are too weak to protect themselves; but, without considering these, the average amount of rates paid by a company which can stand the cost of a rating appeal, should be about 1½d. per 1000 cubic feet, or rather less. In the case of Chesterfield, where the rates generally are high, I allow 40 per cent., and put the rate at 2d. per 1000 feet. This gives an excess of £1220 a year, or £1380 with income-tax. The amount I would add to expenditure under the head of repairs would be £444, or 2d. in the pound; giving a net gain of £936, or reducing the £7660—the cost of manufacture—to £6724. Then on the income side of the account, I estimate that 12 per cent. additional income can be earned on the item of coke, by improved furnaces, and so forth; giving the Company £218 a year. An extra £113 might be made out of tar and residuals; making the revenue £12,782. Comparing the increase on the revenue side with the decrease on the expenditure side, we should have a profit of £6059, which would be sufficient to give more than the maximum dividend. This is the basis of my further calculations. The amount required to pay the maximum dividend is £5741; and this, multiplied by 28·57 years' purchase, would give £164,020. I think that there is a great deal of profit in this undertaking; and I therefore consider I am justified in taking the full dividend, and allowing 28·57 years' purchase.

From your experience, what was the number of years' purchase allowed in these cases in 1881-82?—At least 25 years.

How does your present suggestion compare with 25 years' purchase in 1881-82?—I think it a very moderate proposal. The figure should really be nearer 30 years' purchase. Money is now cheaper, and more easily got, than in 1881-82. Then I add £376 per annum on account of conversion of mortgage debt into 10 per cent. ordinary stock, which conversion the revenue will allow of in the next four or five years. Multiplying this £376 by 28·57 years' purchase, we get £10,740, subject to a slight deduction in consequence of the deferred nature of the debt. There is enhanced income to be made by the adoption of modern appliances and enterprise in encouraging the more extended use of gas for cooking and heating purposes. There are back dividends to be paid applicable to the gas portion of the concern; and there is a large amount of uncalled capital. Under the terms of the Gas-Works Clauses Act, the Company are bound to allot new capital among the shareholders, which is a very valuable privilege to the proprietors. A shareholder for £100 might be entitled to get stock worth £150. That is a distinct property under the circumstances, just as in my own Company if a shareholder has £100 new capital allotted to him, he can go into the market and sell it for £270 odd at once. The increased income would be spent between 1902 and 1922; and the unissued capital and conversion of mortgages would yield £1714 per annum, which, multiplied by 13·4, would give £22,967—raising the total value to £201,329, or, with the addition of the customary 10 per cent. for compulsory purchase, £221,461.

Would that be a fair and reasonable sum to pay for the gas undertaking?—I think so.

Mr. LITTLER: That depends upon whether electricity is extended in the town in place of gas.

Witness (continuing) said that of late years there had been an extraordinary development in the use of gas for cooking and other purposes, particularly among the working classes; and to this he attributed the great strength of the gas undertakings at the present moment. But there was an indisposition on the part of the consumers to sink money in stoves; and facilities for hiring these and coin meters were given everywhere nowadays—everywhere except in Chesterfield. He knew a company which had increased their profits by 2 per cent. in twelve months by these means. Gas was also popularized by the recent introduction of powerful burners, and by the beautiful incandescent system, which rendered the use of this method of illumination acceptable in rooms and places from which hitherto it had been excluded, and which increased the brilliancy of gas from double to five times what it used to be.

The inquiry was again adjourned.

On Friday, the evidence of Mr. H. E. Jones was completed; and this witness was followed by Mr. E. M. Eaton, the Chief Engineer of the Sheffield Corporation Water-Works. Mr. Charles Hawksley next gave evidence in reference to the gas portion of the inquiry; and Mr. Thomas Newbigging, Mr. W. A. Valon, and Mr. H. T. Gratton, the Chairman of the Company, were subsequently called. Saturday's proceedings opened with further evidence by Mr. Hawksley; and then Mr. C. E. Jones, the Company's Engineer and Manager, was examined and cross-examined at considerable length. This closed the Company's case; and Mr. Littler opened that for the Corporation. The inquiry was, after this, adjourned till the 20th inst. A full report of Friday's and Saturday's proceedings will appear next week.

The London County Council and the Water Question.—Lord Denbigh, the new "Moderate" member of the London County Council (elected last Saturday week to one of the seats representing the City of London vacated by the Duke of Norfolk), is "in favour of the proposal to purchase the interests of the Water Companies on an equitable basis, and consolidate these interests under the management of a public Trust."

Larne Water-Works Extensions.—The Larne Town Commissioners, considering that it has become necessary to provide additional storage for water, in order that they may furnish a supply to a portion of the town not at present served, and improve the supply in other parts of the district, have resolved to petition the Local Government Board for Ireland for the requisite powers, and to apply to the Board of Works for a loan of £5000 to carry out the scheme.

THE TYNEMOUTH GAS-WORKS DISASTER.

The Coroner's Inquiry.

The inquest on the bodies of the five men who lost their lives by the disaster at the works of the Tynemouth Gas Company on the 20th ult. was resumed last Tuesday, before Mr. J. R. D. LYNN, the Coroner for South Northumberland.

Mr. H. A. ADAMSON appeared for the Tynemouth Gas Company; and Mr. R. JACKS for the relatives of Charles English, one of the deceased men. In addition to the Chairman of the Company (Mr. J. B. Williamson), the Engineer (Mr. W. Hardie, jun.), and the Secretary (Mr. W. B. Davidson), there were also present Mr. Bernard E. Smith, the Inspector under the Alkali Act for the North of England, and Mr. R. Forbes Carpenter, the Chief Inspector under the Act.

At the commencement of the proceedings,

Mr. *Smith*, at the request of the Coroner, explained to the jury the working of the plant. He said the works, which were really chemical works, and not connected with the manufacture of illuminating gas, were put up under his inspection in 1885. They had since been kept in perfect order; and the plant was of the best kind.

Mr. *Hardie*, who has been Engineer and Manager of the works since November, 1879, produced a plan of the purifying-house in connection with the ammonia works, where the casualty occurred.

Mr. *Smith* then explained the plan, and the manner of dealing with the gas. He said it was quite an everyday occurrence for the workmen to enter boxes such as those where the men lost their lives. Under the Alkali Act, all chemical works were compelled to have these boxes. He had now had twelve years' experience; and only on one occasion, eleven years ago, had such an accident occurred. The only chance of any poisonous gas getting to the boxes was through one of the valves. Before the men went in to clean the boxes, the valves should have been screwed down. It would be distinctly dangerous to enter the boxes with the valves open and the plant working. If the valves had been properly turned off, no gas would have passed into the box.

Mr. *Hardie* was then examined. He said that in winter time, when they were making about 12 tons of sulphate per week, they cleaned out the oxide purifiers about once in three weeks. Previous to cleaning out one, they shut it off, and used a duplicate one. The valve was sunk in a small pit outside the building, and was covered with wood boards, except when it was wanted. The boards were easily lifted. About a fortnight before the accident, the men began to clean out the tank or box; but they were only sent in at odd times, as there was no hurry, and another box was still working. More than half-a-dozen men were working in the box up to noon on Saturday, Jan. 18, when they finished for the week. They had emptied nearly all the oxide of iron, and also lifted part of the sieves. No complaint was made to him of the escape of gas. During the time the men were in, the sulphate plant was working, and had been for the whole of that week. It was not closed down till after noon on the 18th ult. Mr. Vickers, the late foreman, had charge of the whole of the valves. He would either alter them himself, or order other men under his command to do so. Vickers would send the men to the tank when he could spare them from other work.

In answer to the CORONER, witness said they would not hold Mr. Vickers responsible for turning off the valves; but it was his duty to see that it was done. He had been foreman at the works for sixteen years; he understood his work very well, and was a thoroughly reliable man.

The CORONER: Did he know the gas was poisonous?

Witness: Certainly. The ammonia plant was started at 6.30 on the Monday morning, and would send gas into the purifier until it ceased working. The deceased men started work after the dinner hour on Monday, the 20th ult.; and from what he was told, about 2.30 p.m., he went to the purifying-house, and found some men outside who appeared to have been overcome with gas. There were three men in the tank. He (witness) asked two other men to go in, while he and others stood on the edge. The volunteers got the men out, but had to be assisted themselves. Witness examined the valve the following morning, and noticed that oxide had been thrown out of the purifying-house, and was lying on a portion of the boards forming the covering of the valve. The oxide had no appearance of having been disturbed. On lifting the boards, he found that the valve had not been closed by about a quarter turn of the revolution of the lever.

The CORONER: What space would that leave open?

Witness: About a quarter of an inch. The space would be equal to 1·25 square inches for the gas to pass through. In his opinion, the valve had been open to that extent from the time it was altered a fortnight previously. The valve was in working order when taken up on the following Friday. The valve might, and probably did, stick; and the person turning it off would think it was home when it was not. It did not require much exertion, even on the Tuesday morning, to turn it quite close.

The CORONER: Was the valve not turned off in consequence of the negligence of some person or persons, or was it in consequence of any defect in the plant?

Witness said he could not answer positively. The valve was in working order.

Replying to further questions, witness said he found a deposit in the pipes at the foot of the valve; but it did not interfere with the working of the valve. Three of the deceased men went to the rescue of the two others who had been overcome by gas. There were no respirators on the works; and he must confess to ignorance of the requirements of the law in that respect. He had worked this plant eleven years; and nothing like the present casualty had occurred. It had never been brought to his knowledge that there were such special rules under the Factory and Workshops Act. The works were registered under the Alkali Act.

By the JURY: There had never been a complaint as to a catch or any defect in the working of the valve.

By Mr. SMITH: Both on the Saturday and the Monday, the pressure on the valve would be very light.

By Mr. JOHNSON (Inspector of Factories): The valve had not been taken out for examination for eleven years, as it had always worked perfectly, and he considered there was no need to do so.

By Mr. JACKS: The catch in the valve had never been reported to him. It would be Mr. Vickers's duty to see that it was properly turned off; but he would not say that its not being turned off was negligence. He considered the valve in proper condition now. Witness had no cause to believe that the tank was not safe for the men to enter on the Monday afternoon.

James Cummings, a blacksmith, who had been in the employ of the Company for the past 21 years, deposed that he was present with Mr. Hardie and three other men when the valve was examined on Jan. 21. It took a turn and a half to fully open it, and a turn and three-quarters to close it, so the valve must have been open a little.

By Mr. JACKS: The valve was shut off without any catch so far as he could judge.

Christopher Cumpson, a labourer at the works, said he was present when the accident occurred. Main and English were in the box before he reached there. Witness did not notice any smell of gas in the purifier at that time. Main fell in the corner of the box; and English, who was standing on the wall about to go in, fell off into the tank. When the men fell, Mr. Vickers and witness jumped in after them to rescue them. They both got hold of English, and dragged him to the wall. Vickers was holding English up; but witness was overcome with gas, and was pulled out of danger.

James Robson, who had been eight years at the works, stated that he and Cumpson were leaning over the wall to help English out, when both Mr. Vickers and English fell backwards into the tank. Cumpson was then overcome; and witness pulled him out into the open air. Forster and Taws at the same time rushed in. After taking Cumpson out, witness returned, and found the five men lying in the tank. He thereupon ran out, and shouted for more assistance. John Patterson came; and he leaned over the pit and caught hold of Mr. Vickers. Witness held on to Patterson, who himself was overcome, and fell outside the tank. He was sent to another part of the works; and when he returned, the men were all out. The five men he saw lying in the tank were John Main, Charles English, William Vickers, David Taws, and Joseph Forster. The latter was rescued, and had recovered. He did not see M'Guire.

William Reay, a bricklayer at the works, said he heard shouts for help, and went with M'Guire to render assistance. When they reached the purifying-house, some men were carrying Vickers out; and they saw Taws, Main, and English lying in the tank. The smell of gas was strong. Witness put some cotton waste in his mouth, and told M'Guire to put his sweat rag over his mouth; but he did not do so. They both jumped upon the wall, and M'Guire immediately fell into the tank. Witness jumped in, and turned M'Guire on to his side. A man named Johnson jumped in, but was overcome, and fell against witness. Some men dragged him out; and witness, finding himself going, came out into the fresh air. After reviving, he got a new piece of cotton waste, and went in a second time. On that occasion, he brought out M'Guire, Taws, Main, and English. They were all dead. He felt a little dizziness, and a sweet taste in his mouth, but no more inconvenience.

A JUROR: A great amount of praise ought to be given to the witness for what he did.

The CORONER asked if witness had had any previous experience of the kind.

Witness replied that he had had some little escapes; but he always found that cotton waste in his mouth prevented the inhalation of gas.

This concluded the evidence.

The CORONER said they had already had Dr. Martin's testimony as to the cause of the deaths of the five unfortunate men—viz., asphyxia consequent on their inhaling sulphuretted hydrogen, which appeared to be a very deadly gas. He asked the jury to divide the verdict into two heads, because Main and English went into the tank in the execution of their ordinary employment, and the other three men, Vickers, M'Guire, and Taws, went to rescue their fellow workmen. They would have to consider whether the valve was not properly turned off in consequence of a defect in the plant, or of negligence on the part of some of the workmen.

The jury, after about 20 minutes' deliberation, found that the cause of death was in accordance with the doctor's evidence, that two of the men died in the execution of their duty, and that the other three lost their lives in attempting to save them. With regard to the cause of the accident, they were unanimously of opinion that the valve had been accidentally left open a little, but by whom they had no evidence to show. They recommended that the provisions of the Act with regard to respirators should be carried out, and that steps or other means of entry to and exit from the pit should be erected.

The CORONER approved of the finding of the jury.

Mr. ADAMSON intimated that the recommendations would receive every consideration from the Directors of the Company.

THE ILFRACOMBE GAS BILL.

The Ilfracombe Gas Company will go to Parliament in the ensuing session with much brighter prospects of success than attended them last year. The new Bill, like the one which was rejected in 1895, has for its principal object the removal of the works to a new site at Hele. But the scheme has undergone important modification; and the opposition, which was then so strenuous, has been mollified. A special meeting of the shareholders in the Company was held last Saturday week to formally approve of the Bill. Mr. T. D. Wivell, the Chairman of the Company, who presided, said it was not necessary for him to show how terribly cramped their present site had become. The Directors believed the Bill to be a fair one for all interested. With their Engineer, Mr. Corbet Woodall, they had met the Ilfracombe District Council, and settled all their requirements and objections in a very friendly spirit. So far as could be seen, the measure would not now be opposed. He moved that the Bill be approved, subject to such alterations, additions,

or variations as Parliament may see fit to make therein. Mr. S. Day, who seconded the motion, congratulated the Directors on the improvement in the Bill over that of last year. He hoped the Directors would see that the outlay was not too excessive. Mr. J. F. P. Finch, the Solicitor to the Company, explained, in answer to a question, that the £40,000 to be applied for was additional capital; making £60,000 in the whole. This was £30,000 less than the sum stated in the Bill of last year. An independent person would probably be asked to state the value of the 5½ acres of land required for the works. The Directors did not desire to make a profit on the land. Mr. H. F. Willey (Exeter) supported the motion, and said he thought no exception could be taken to the present Bill. The resolution was unanimously adopted.

THE DUBLIN CORPORATION BILL.

Meeting of Burgesses.

The Statutory Meeting of burgesses to consider the Bill which is being promoted by the Dublin Corporation was held last Wednesday. The Lord Mayor presided; and, after the text of the Bill had been read, he enlarged upon the clauses over which there was likely to be most contention. Referring to the water clauses, he spoke of the waste of water in the out-townships, and said the object of the Corporation was to compel them to pay for the water they used. In dealing with the gas question, his Lordship travelled over the old ground. He said he had been connected with the Corporation for several years; and he did not really know that any question had ever given so much trouble to them as this. They had tried every possible means of settling the matter, without having to resort to an expensive measure to bring about a satisfactory arrangement between the consumers and the suppliers. The Corporation had utterly failed; and if the burgesses were to-day satisfied to accept 12 or 13 candle power gas when they were entitled to 16-candle power, of course the Bill need not be proceeded with. But if they considered as consumers that this state of things should not continue, he asked them to support the Corporation in getting the Bill passed into law. The Corporation had also asked the Company to adopt the up-to-date photometer; but they refused. They had at present in use an instrument which would not be tolerated in any other city in the world; and they meant to keep it if possible. Practically the Company intended to compel the citizens to accept whatever light they were pleased to give, charging the enormous price of 3s. 7d. per 1000 cubic feet, as compared with 2s. 9d. in Belfast, with discounts ranging from 2½ to 10 per cent. Alderman Meade proposed a resolution, authorizing the application of the borough funds to the promotion of the Bill. This was seconded by Mr. Ireland. Mr. Paul Askin followed with a protest against the attitude assumed by the Corporation towards the Gas Company, and said he did not think it right for citizenzs to go for an Act of Parliament to interfere with the business of a private concern. The High Sheriff was of opinion that there was no possibility whatever of coming to terms with the Company without taking this course. Mr. G. Thompson, a member of the Council, wanted to have the matter amicably settled, and thus save the expense of fighting all the townships around Dublin, and also the Gas Company. He proposed, as an amendment, that the further consideration of the Bill be postponed for a month, and that in the meantime the Commissioners of the townships concerned in the water clauses and the Directors of the Gas Company be invited to meet the Corporation in conference, with a view to an amicable arrangement, which, if come to, would, he said, save the ratepayers an enormous bill of costs. Mr. Bridgeman seconded the amendment. He said he had gone into the gas question pretty closely; and he found that, if the Corporation would buy out the Company at the ordinary price of the shares on the Stock Exchange, and raise the money (as they could easily do) at 3 per cent., the citizens would gain £25,000 a year. He failed to see why the Corporation could not meet the Company and come to terms. Alderman Dillon assured the meeting that there was not one member of the Corporation Lighting Committee who had any feeling of animosity towards the Gas Company. The Corporation had tried over and over again to come to an understanding with the Company; they had had several interviews with the Directors, and many matters in dispute had been adjusted. The questions, however, dealt with in the Bill—the illuminating power, quality, and price of gas—were matters which the Directors absolutely refused to discuss; and he was not aware of any tribunal competent to investigate the question except a Committee of one of the Houses of Parliament. Notwithstanding this, if there was any means of having a conference between the Directors and any dozen members of the Corporation, he would be delighted. The Lord Mayor said that Mr. Thompson would withdraw his amendment on his (the Lord Mayor's) undertaking that a meeting of the Corporation would be summoned, to which the Commissioners of the different townships and the Directors of the Gas Company would be invited. In accordance with the law on the matter, he would substitute his own name for that of Alderman Meade as the mover of the resolution. The resolution was then carried without dissent.

THE CHELTENHAM CORPORATION AND THE GAS COMPANY.

At the Quarterly Meeting of the Cheltenham Town Council on Monday last week—the Mayor (Alderman Colonel Rogers) presiding—there was a long discussion on the present position of the gas question. The report presented by the Lighting Committee showed that, towards the end of last month, they submitted to the Gas Company certain proposals, upon the adoption of which they undertook to recommend the Council to withdraw the Corporation Bill. The correspondence which had passed between the two bodies, and which embodied the terms referred to, was read by the Town Clerk (Mr. E. T. Brydges), as follows:—

Municipal Offices, Cheltenham, Jan. 23, 1896.

Dear Sirs,—The Corporation are promoting their Bill in the interests of the public and the consumers of gas; and among the principal objects they propose to attain are the following: To increase the illuminating power of the gas to 16 candles, tested in the town. To decrease the maximum impurity in the gas from sulphur, from 30 grains to 20 grains in every 100 cubic feet of gas. To increase the pressure. To reduce the maximum price from 4s. and 5s. to 3s. both within and without the borough. To borrow money at the lowest possible rate. To raise £50,000 instead of £100,000, as proposed by the Company's Bill.

I am directed by the Committee having charge of the promotion of the Corporation Bill and the opposition to the Company's Bill, to inform you that if your Company are prepared to insert clauses in the Bill providing: (1) That the illuminating power shall be 16 candles, tested in manner prescribed by the Corporation Bill; (2) that the gas shall not contain more than 20 grains of sulphur in every 100 cubic feet of gas; (3) that the gas shall be tested at the Central Testing Station of the Corporation; (4) that the pressure shall not be less than 8-10ths of an inch from sunrise to sunset, and not less than 1 inch from sunset to midnight; (5) that the maximum price shall not exceed 3s. per 1000 cubic feet; (6) that the provision as to sale of stock by auction shall apply to mortgages and debentures; and (7) that the capital to be raised shall not exceed £50,000—the Committee will recommend the Council to withdraw the Corporation Bill.

If a reply in the affirmative is received on or before the 1st of February, the Council will give an absolute decision on the 3rd. If no reply is received by that date, it will be assumed that the offer is not accepted. If it is not accepted, you must, if you please, consider that it is made without prejudice, and not to be used before any Committee of the House of Commons on the hearing of the case for the Corporation Bill.—Yours faithfully,

E. T. Brydges, Town Clerk.

To this the following reply was received:—

Cheltenham, Feb. 1, 1896.

Dear Sir,—We have submitted your letter of the 23rd ult. to our Directors, and are instructed to reply, expressing their regret that they cannot accept the proposition submitted by your Lighting Committee; but that provided the Corporation Bill is withdrawn, they are perfectly willing to meet your Committee in conference upon the points formulated in your letter, in which case they trust that, by mutual concessions, a satisfactory arrangement may be arrived at, by means of which the heavy cost, both to the ratepayers and the Company, of a lengthened parliamentary conflict may be avoided.

We are instructed also to point out that the object stated in your letter—viz., the protection of the interests of the public and gas consumers—is quite distinct and apart from the question of compulsory purchase of the Company's undertaking.—Yours faithfully,

F. & W. Griffiths, Clerks to the Company.

Alderman Norman, in moving the adoption of the minutes of the Committee, stated that, owing to unfortunate circumstances, he had not been able to take part in the recent proceedings of the Committee. With reference to the letters which had been read, he should act with the majority on a matter of policy like this; but, at the same time, he did not shift from the position he had taken up, that the main feature of the whole question was that of the principle that local monopolies should be in the hands of the governing body of the town. The propositions made to the Gas Company would, if they had been accepted, have accomplished a very great benefit to the town in regard to the supply and illuminating power of the gas. But he imagined, now that the reply of the Company had been received, refusing the overtures made to them, that this resolution fell to the ground, because he could not conceive that the Corporation would take the position of withdrawing their Bill in the hope of obtaining satisfactory terms at the "friendly conference" suggested by the Company. They had asked the Company for nothing that was unreasonable. The Committee's conditions were exactly those which the Council proposed in their own Bill.

Captain Griffith seconded the motion.

Alderman Wethered was sorry the Company had declined a conference on the points indicated, because they were points of importance to the consumers and the town. There was no doubt that, as regarded illuminating power, the gas was much below what it ought to be. He was opposed to purchase; but he quite admitted that the stipulation of the Company that the Corporation Bill should be withdrawn before the holding of a conference was altogether unreasonable.

Mr. Lawrence remarked that it was a most unfortunate circumstance that, through no fault of his own, Alderman Wethered had been absent from every important meeting of the Lighting Committee at which the question of promoting a Bill for the purchase of the gas-works was discussed. Particularly was it so in the case of the meeting which was attended by the expert, Mr. Stevenson. That was the meeting at which he (Mr. Lawrence) was converted; and he was prepared to say that any man of common-sense, upon hearing the evidence which Mr. Stevenson put before the Committee, would have been converted. The Corporation had undertaken to do what they could to obtain good gas for the consumers of Cheltenham; and the Committee were advised by Mr. Stevenson that the best way of getting what they required was by promoting a Bill for the purchase of the Company's property. But if the Company would grant the concessions sought, he (Mr. Lawrence) should be prepared to vote for dropping the opposition to their Bill, though they would then have obtained only what they ought to secure for the consumers. If, however, the ratepayers allowed the Company to increase, as they were seeking to increase, their capital by £100,000, there would never be another opportunity in their lifetime, nor in the lifetime of their children, for the Corporation to go to Parliament again.

Mr. Ward-Humphreys, referring to the recent public meeting of ratepayers, said the majority proved adverse on that occasion; but he was bound to say that neither then nor since had he heard any valid arguments against the policy which the Council had adopted.

Alderman Norman having replied, the motion was adopted.

Proposed Purchase of the Skipton Gas-Works.—The Skipton District Council have resolved to enter into negotiations with the Gas Company with the view of acquiring their works for the town. A similar proposal was made a few years ago, but was rejected by the Company. It is now alleged that the shareholders are more disposed to sell than formerly.

MANCHESTER CORPORATION GAS DEPARTMENT.

Appointment of Mr. Stevenson as Consulting Engineer.

At the Meeting of the Manchester City Council last Wednesday, on the motion of Alderman Gibson, seconded by Alderman Higginbottom, the following resolution of the Gas Committee was adopted: "That having regard to the alterations and extensions in progress and in contemplation at the respective gas-works, the Committee are of opinion that the present is a convenient opportunity to take into consideration the appointment of a consulting gas engineer to report and advise the Committee in the future; and as Mr. G. E. Stevenson, C.E., the Manager of the Rochdale Road gas-works for the past four years, has acted as Consulting Engineer to the Committee, and has carried out some very important extensions during that time, and has proved himself a thoroughly practical gas engineer, Mr. Stevenson be and he is hereby appointed Consulting Gas Engineer, to advise the Committee, in conjunction with the Managers, from time to time upon any work requiring to be done, to pay a quarterly visit to the gas-works, and make a full and complete report on their condition, to prepare all plans and working details for alterations and extensions, and to have the control of such work during the progress of the alterations and extensions; and in consideration of such services rendered, he shall receive £200 a year in addition to his present salary of £500 a year as Manager of the Rochdale Road works, which position he will still retain." There was a brief discussion on the subject, in the course of which Mr. Southern expressed some doubt as to the wisdom of making a dual appointment such as that contemplated.

THE MANCHESTER CORPORATION AND THE WORKING UP OF GAS RESIDUALS.

The Local Government Board Inquiry.

On Tuesday last, Colonel W. M. DUCAT resumed, on behalf of the Local Government Board, the inquiry in regard to the application of the Manchester Corporation for power to utilize and manufacture, on ground at present forming part of the site of the Bradford Road Gas-Works, coal tar, coke, pitch, ammoniacal liquor, and other residual products, and to sell and dispose of such products.

Mr. HUDSON, the Deputy Town Clerk, appeared for the Corporation; Mr. SUTTON and Mr. R. RICHARDS represented certain property owners and ratepayers and the Manchester and Salford and District Property Owners' Associations, who opposed the application.

Mr. *G. E. Stevenson*, Gas Engineer to the Corporation, who was under cross-examination when the inquiry was adjourned [see *ante*, p. 83], continued his evidence. He first put in a fresh estimate of the working expenses.

Mr. SUTTON protested against the introduction of a fresh set of calculations when the inquiry was half over. He thought at all events he should have been furnished with the new figures.

Mr. HUDSON said they had only been completely matured during]the previous day or two.

Mr. *Stevenson* said the difference between his present estimate of working expenses and the one handed in on the last occasion was 5s. 7d. per ton. In his estimate, he had not allowed anything for the carriage of the ammoniacal liquor from the Gaythorn works to the Bradford works, or for rent and rates on the land on which the plant was to be erected. He had not done so because the cost of carriage from Gaythorn to Bradford was already allowed for in the price the contractors paid the Corporation for the liquor, and because the rent and rates on the land were already dealt with. There had been no determination to increase his salary in connection with this new undertaking. It was a fact that the Committee proposed to increase his salary; but this was simply in his capacity of Consulting Engineer, and on account of his services in the past. He could not say that he would either manage or supervise the manufacture of sulphate of ammonia. The works would be superintended, of course, and probably by the chemist who would be engaged for the manufacture of sulphuric acid. He would have £200 a year. Witness did not deny that at Beckton, where they had the best plant in the world, they had only made 1s. 8·63d. by working up the ammoniacal liquor, as against 1s. 9·81d. obtained for it unworked in Manchester. The Beckton and Manchester works were not on all-fours in this matter, as The Gas-light and Coke Company had works scattered all over London; and from these they had to send the liquor to the residual works at Beckton, which no doubt cost a good deal. He had always been aware that the published returns from Beckton were not as favourable as those from some other works. With the best plant they could obtain, he believed the Corporation could make sulphate of ammonia at a profit as he had previously indicated. Salford, by working up their ammoniacal liquor, made a larger profit, in a recent year, than Manchester. He did not know whether it was true or otherwise that in the last four years Manchester had obtained as much as Salford.

In re-examination by Mr. HUDSON, witness said they had been told that Messrs. Hardman and Holden, of Miles Platting, estimated the total cost of the manufacture of sulphate of ammonia at £3 9s. This was against his estimated working expenses of £2 17s. 4d. He considered he could manufacture at a less cost than Messrs. Hardman and Holden for several reasons.

Mr. *Thomas Newbigging* said he had for years advocated the policy of gas authorities manufacturing their residual products, and particularly converting the ammoniacal liquor into sulphate of ammonia. By doing this, the profits would be increased; and consequently, the price of gas could be reduced, in which event it would be used to a greater extent for various purposes, such as cooking and heating. This would tend to the abatement of the frequent recurrence of fogs. The process of manufacturing sulphate of ammonia was a very simple and profitable one. He calculated that the Corporation could increase their profit by £4183 a year, or £4745, including the sinking fund, by carrying out their scheme. It did not follow that because the Corporation realized a fair price for their ammoniacal liquor now, they would always be able to do so. He would assume that, if a company had renewed their contracts with the Corporation for the past fifteen or twenty years, it was a profitable business. He would come to that conclusion from the opposition they had seen there that day. In his judgment, it was a perfectly right policy for the Corporation to desire to put themselves in the position of manufacturers. Almost every small gas-works in the kingdom had the power to do it; and there were no fewer than 300 gas-works now manufacturing their own sulphate. He had had a large experience in this direction in different parts of the country; and he was clearly of opinion that these works could be carried on without creating a nuisance in the neighbourhood, particularly if the two manufactures of sulphate of ammonia and of sulphuric acid were carried on together. He thought the site chosen for the works was suitable in all respects; and he believed that Manchester was a place in which the manufacture could be carried on in a cheap manner.

Replying to Mr. SUTTON, witness said he did not think this was a risky business, in which there were large fluctuations in price. Even if it were so, he did not believe it would be so risky for a gas-works as for a private individual. He had never known a gas-works make a loss on sulphate of ammonia during all the years he had been associated with them. He agreed that, generally, it was not a desirable thing to injure a ratepayer if they could avoid it; but if they could benefit 10,000 ratepayers, he did not see why they should be debarred from so doing. There was, perhaps, more difference of opinion with regard to the distillation of tar than with regard to the manufacture of sulphate of ammonia; and, though the matter was not before them at present, he dared say he should have recommended the Corporation to adopt it if he had been asked his opinion.

Alderman *Higginbottom*, the Deputy Chairman of the Gas Committee, said that up till last year, when the Committee advertised for tenders for ammoniacal liquor, several offers were received; but last year only one firm tendered for the liquor produced at the two principal stations. The Committee felt they were in one firm's hands, and in an awkward position. The tenders were all for one, two, and three years; but the Committee decided to accept a tender for only one year, in order that they might themselves make arrangements for working up the ammoniacal liquor. The City Council had approved of the action of the Committee. In his opinion, the site on which it was proposed to erect the works was admirably suited for the purpose; and he believed the works could be constructed for £25,000.

Mr. *G. H. Bailey*, of Owens College, said he had made a special study of matters concerning the pollution of the air. He was of opinion that the operations proposed by the Corporation could be carried on absolutely without nuisance to the neighbourhood.

Mr. *Charles Nickson*, the Superintendent of the Corporation Gas Department, said that Messrs. Hardman and Holden had for the last fifteen to twenty years taken the liquor, the tar, the spent oxide, and a small portion of the coke produced at the works. In fifteen and a half years, the firm's transactions with the Corporation had amounted to £682,000, or an average of about £44,000 a year.

In answer to Mr. MABEN (a ratepayer), witness said the pipes by which the liquor was conveyed were laid between the gas-works and Messrs. Hardman and Holden's works, by the firm, on the understanding that the pipes should become the property of the Corporation. The pipes were allowed to be laid as a matter of mutual convenience. He thought that the fact of their being there had enabled the Corporation to get not a worse, but a better, price for their liquor than they otherwise would have done. As to tar or liquor, the system had always been to take the highest price offered.

Mr. SUTTON then addressed the Inspector. He said he appeared for a number of ratepayers and for Messrs. Hardman and Holden, who were not only large ratepayers, but were also directly interested in the matter of this inquiry. The Corporation sought powers not only for the manufacture of sulphate of ammonia, but also for the manufacture of all the various articles which were obtained from tar. There had been some evidence adduced with reference to the position of the Corporation to produce sulphate of ammonia; but absolutely no proof had been laid before them that they were in a position to manufacture advantageously the products of tar. Until such evidence was forthcoming, he submitted that it was undesirable that the Corporation should be allowed to enter into competition with their own ratepayers, and to take upon themselves the risks and dangers of commercial enterprise. Such powers as were now being sought ought not to be granted to the Corporation unless it could be shown that there was some great advantage to be derived from them by the community, which would counterbalance the inconvenience and loss which might be occasioned to other ratepayers, and which might bring upon them the destruction of the capital they had embarked in a commercial undertaking in the belief that they would only meet ordinary competitors. The works of Messrs. Hardman and Holden were thoroughly equipped on the most modern lines for the very manufacture which the Corporation sought to enter upon; and even the Corporation could not be in a better position in this respect. Manchester had hitherto, without taking any risk, done as well as any other chief town in the country out of the residual products of the gas-works, and this alone furnished a strong reason why the powers which would enable them to enter upon a new and risky undertaking should not be granted.

On the proceedings being resumed on Wednesday, evidence was called on behalf of the opposition.

Colonel *S. A. Sadler*, the Managing-Director of Messrs. Sadler and Co., of Middlesbrough, said, in his opinion, the works proposed by the Corporation would cost, not £20,000 to £25,000, but £33,000. The Engineer of his Company put the figure at £35,000. As an old member of the Middlesbrough Town Council, he knew that corporation estimates were often largely exceeded; and he thought this case would be no exception to the rule. His experience also showed him that the Corporation would require more men in various parts of the works than they calculated upon. There was another serious mistake on the part of Mr. Stevenson and Mr. Newbigging, who had taken the theoretical yield of acid as the basis of their calculations, whereas in practice they

never obtained the theoretical yield. He calculated that, instead of the sulphuric acid costing 14s. 3d. per ton of sulphate, as estimated by Mr. Stevenson, it would cost 25s. 2d. The total cost per ton of sulphate, including discount and brokerage, would be £4 10s. 1d., instead of £2 17s. 11d. For wages, where Mr. Stevenson put down 4s. 2d., witness calculated 10s. Mr. Alfred Colson, the Corporation Gas Engineer of Leicester, gave the actual amount in the case of his works at 10s. 9d. Taking the value of sulphate at £8 10s. (it was £8 7s. 6d. at present), it only left £4 net for the liquor required to produce a ton of sulphate. Instead of the profit anticipated, there would be a loss of 25s. 7d. per ton of sulphate, which would make the total loss £5116 per annum. He thought it a great hardship on Messrs. Hardman and Holden, who had erected works at enormous cost, and who for several years had paid a higher price for liquor than other firms, that the Corporation should come forward with this scheme. He believed that no corporation could get as good a return in an enterprise of this sort as private people. Messrs. Hardman had special uses for gas liquor which enabled them to pay more for it than persons who only used it for sulphate of ammonia.

In reply to Mr. SUTTON, Mr. HUDSON said the Corporation did not at present contemplate the distillation of tar; but they desired general powers, such as had been granted to other towns. The question of the actual site of the tar-works could be left for further inquiry when it had been fixed upon. If the Corporation had the powers asked for, they would be able to command a better price for the raw material, while they continued to sell it.

Witness (continuing) said the competition for tar was very keen; and he was satisfied that no corporation could possibly make the distillation of tar pay as well as private firms, who usually had specialities to which to devote it. The Gaslight and Coke Company, although they had works which had been erected at enormous cost, had not during the last ten years realized as much for the finished products as they could have realized for the crude tar when the cost of the manufacturing process was taken into account.

In cross-examination, witness said he did not suggest that, in proper hands, the manufacture of tar was unprofitable; but the business was full of risks. It was true that a corporation might obtain better prices if they had the power to distil tar themselves, and held a rod of terrorism over the tar distillers. He feared Messrs. Hardman and Holden were losing on the manufacture of sulphate of ammonia. He supposed the reason why they were opposing the Corporation scheme was that they were hoping for better times. He had heard Mr. Stevenson say that his estimate of wages was based upon the experience of Sheffield; but he did not know how the figures were made out. He was of opinion that the Corporation would have to employ two chemists and two or three clerks for the new department.

Mr. *Holden*, Chairman of the Directors of Hardman, Holden, and Co., submitted figures to show that the witnesses for the Corporation had very much under-estimated the cost of making the sulphuric acid and the sulphate of ammonia. They had omitted from their estimates all allowance for rents, rates, and taxes. This would give the Corporation an unfair advantage in competition with a private trader; and, in his opinion, they should not be allowed to obtain this advantage by freeing themselves from these charges. He put in figures with the view of proving that Manchester had been receiving more for ammoniacal liquor than other towns mentioned during the inquiry had derived from working it up. Last year, in consequence of the fluctuations of the market, his Company lost upwards of £3000 on the manufacture of sulphate; while, since they had been engaged in the process, their profits had only amounted to about 3 and 3½ per cent. on their whole turnover of sulphate. In this condition of things, he would be quite willing to enter into an arrangement with the Corporation to manufacture sulphate of ammonia at a very reasonable commission. He could not do worse, and he might do a great deal better. He was also prepared to put down the best appliances that could be obtained, if their present machinery was not considered efficient. A gas committee, in his opinion, would have great difficulty in dealing effectively both with the manufacture and sale of sulphate.

The proceedings were continued on Thursday by

Mr. *Holden* giving further evidence in opposition to the application. He said that his firm had paid an exceedingly good price for the tar during the years they had obtained it—generally from 3s. to 4s. per ton more than the price quoted in the open market. The reason the Company did not get the tar contract last year was because somebody else make a higher offer. His Company's offer would have been larger but for the fear that the quality would not be up to the mark. In the previous year, the quality was low; and although the Corporation did make some allowance for this, they distinctly stated that they recognized no legal liability. He thought that, in the event of coal reaching a high price, there might be a recurrence of such trouble. His Company some years ago erected an alizarine plant at a cost of between £30,000 and £35,000. For two years the alizarine business was profitable. But now it was not so; and for seven years the plant had been practically idle and valueless. In like manner, the chemical trade underwent vicissitudes as to other processes. The discoveries were so frequent that they never knew what would happen from year to year. The Company had one chemist engaged in research work alone.

In cross-examination, witness admitted that, in estimating the cost of the sulphate, he had included "salaries," which item, as to three-eighths of it, was made up of the salaries of the managing director and directors. This would have to be deducted from the estimate, in view of the fact that the members of the Corporation, who were in a position corresponding to that of the directors, were not paid for their work. He denied that the market price of sulphuric acid was 23s. 6d. per ton, as stated in a technical journal, or 1s. 6d. per ton less than he gave as the cost of manufacture. Trade journals were often wrong as to prices.

Mr. *John Craven*, chemist to Messrs. Hardman, Holden, and Co., agreed with the figures put in by Mr. Holden as to the actual cost of working up the sulphate of ammonia. The sulphuric acid could not possibly be manufactured, in his opinion, for the price named by the Corporation witnesses.

Mr. SUTTON and Mr. HUDSON then addressed the Inspector, and the inquiry closed.

THE POSITION OF THE DARLINGTON CORPORATION GAS-WORKS.

A long report upon the manufacturing power of the Darlington Corporation Gas-Works, prepared by the Chairman of the Gas Committee (Alderman Barron), was submitted at the meeting of the Town Council last Thursday. In order to show the extraordinary rapidity with which the demand for gas has increased in the last ten years, Alderman Barron stated that in 1885 the total make was 151,164,000 cubic feet, and in 1895 it was 232,435,000 cubic feet—an increase in the ten years of 81,271,000 cubic feet. The present producing capacity of the retort-house on the new side of the works was 1,235,000 cubic feet per day, so that on the new side the retorts, if all in working condition and without any breakdown, were only capable of producing 16,000 cubic feet per day in excess of the greatest day's demand during last month; while the make on that day, as compared with the greatest day's make in the previous year, had increased by 156,000 cubic feet. Until they had increased producing power on the new side of the works or elsewhere, it would be absolutely impossible to do away with the reserve of retorts and producing plant on the old side. The total storage capacity of the works, both old and new, was 975,100 cubic feet, provided in four gasholders, which were in good working order. The present storage, however, fell far short of a day's supply; so that, if by any chance the producing power was stopped by accident, they would not have in stock a sufficient reserve of gas to supply the requirements of the town for one day. Alderman Barron was of opinion, after consultation with the Manager, that, to be properly equipped with storage for the requirements of a town the size of Darlington, with its rapidly increasing demand for gas, for all purposes, it was essential that they should erect, without delay, a gasholder having a holding capacity of about a million cubic feet, and capable of being enlarged as required, up to about 1½ million feet. For the purpose of providing room for immediate requirements and extensions in the near future, the erection of a new holder, and securing a tipping ground, the Committee had, with the approval of the Council, entered into an arrangement for the purchase of a piece of land on the north side of the old Stockton and Darlington Railway at a cost of £3000. After the recent public meeting declined to permit the application to Parliament for (among other things) power to borrow the money for the proposed extensions, the Town Clerk was instructed by Alderman Barron to make an application to the Local Government Board for a Provisional Order for the purposes contained in the gas clauses of the Bill; but he was informed that no Order could be obtained during the present year for any of these purposes. Under the circumstances, it becomes necessary to consider the question of ways and means. The borrowing powers under the Act of 1872 were exhausted; and therefore unless power could be obtained from the Local Government Board to borrow money for the purposes of the extensions (for which he suggested that application should immediately be made), it would be necessary either to defer such extensions until power could be obtained from Parliament, at the risk of jeopardizing the gas supply of the town, or pay for them out of the revenue arising from the works—thus depriving the ratepayers of that assistance in relief of the rates which they had enjoyed for many years. According to the rate of increase attained during the past eleven years, the probable quantity of gas required in the year 1905 will be 360 million cubic feet, with a maximum day's requirement of 1,800,000 cubic feet. In order to meet the probable demand for gas in the future, provision should be made for the following capital expenditure: Retort-house, £7500; condensers, exhausters, scrubbers, washers, boilers, and engines, £4500; purifying-house and purifiers (which would not be required for nearly ten years), £4000; station meter and meter house, £1000; gasholder to contain 1 million cubic feet, £12,000; additional leading mains, £5000; extension of coal depôt, £2000; total, £36,000. This plant would be capable of producing 600,000 cubic feet of gas per 24 hours. Add cost of land, £3000; contingencies, £2000; gas-meters and cooking-stoves, about £500 per annum, which, being capitalized, represents £5000—gross total, £46,000.

Alderman BARRON, in moving the confirmation of the minutes, of which the report formed a part, said he commended the report to the consideration of the Council for obvious reasons. They were at the limit of their borrowing powers, and very nearly at the limit of their producing powers; and the time had arrived when he was looking with considerable alarm on every fresh application for gas. He hoped the Council would be able to recommend that application be made to the Local Government Board to see whether they could by any process help them to borrow money. If they did not get such help, they would have to pay for works out of revenue, which would be a serious loss to the ratepayers of the town.

Mr. STEWART seconded the motion, which, after some discussion, was adopted.

ABERAVON CORPORATION GAS-WORKS.

Application for a Provisional Order.

A Local Government Board inquiry has been held at Aberavon, by Colonel J. O. HASTED, relative to an application by the Corporation for a Provisional Order to alter or amend the provisions of the Aberavon Local Board Act, for the following purposes: (1) To enable the Corporation to erect and maintain works for the manufacture and storage of gas and residual products upon certain lands, amounting in all to 2 acres or thereabouts, on Aberavon Sands. (2) To enable the Corporation, in the event of works being erected on this land, to dispose of the existing gas-works. (3) To provide for the application of the moneys arising therefrom. (4) To enable the Corporation to borrow additional money for gas-works purposes.

The TOWN CLERK (Mr. M. Tennant), in addressing the Inspector, mentioned several causes which necessitated the erection of new works, principal among which were the growth of the borough, and the fact that when the existing works were purchased, they were in a dilapidated state and very small. Last winter there was a difficulty in supplying

the wants of the consumers; and, of course, unless provision were made, this would be more strongly felt. The proposed site for the new works was situated outside the town, but conveniently close to the Rhondda and Swansea Bay Railway. As to borrowing powers, they obtained a loan of £5000, which was extended in 1876 to £7500; and by a Provisional Order granted in 1880, they had power to borrow an additional £7500. Of this £15,000, they had still left £1525. Of the £13,475 borrowed, they had paid back £7400; leaving a present indebtedness of £6075. As to the new borrowing powers, he believed £15,000 was mentioned. The total estimated outlay on the new works was nearly £19,000; but they had £1525 left under a former Order.

The INSPECTOR thought it was not advisable to cut their requirements too fine.

Mr. *E. H. Stevenson*, the Consulting Engineer, considered it would be as well to ask for £20,000.

Mr. TENNANT agreed; but pointed out that it was not necessary to spend the whole amount.

Mr. *Stevenson* was then examined. He said that in 1888 he visited Aberavon, and made a report on the existing gas-works. He then advised the Council to purchase a new site; the present works being too cramped, which resulted in loss of money. He approved of the site now selected as the most suitable. The make of gas was 12 million cubic feet in 1888, and 17 million feet in 1894. Owing to the station meter being out of order, they had to estimate the quantity of gas made in 1895; but it was nearly 18 millions. The present works were not equal to the demand, especially as to the gasholder, which held only 50,000 cubic feet; while looking to the growing district, the minimum should be 100,000 feet. There was only one holder; and the loss would continue to increase yearly, unless new works were put up. Loss was also occasioned by haulage, which would be obviated in the new scheme by a railway siding. With new works and ample storage, there would be economy in production. It was proposed to lay a 12-inch main for the first section of the works; and a larger one would be substituted when the second section had to be built.

There was no opposition; and, after the inquiry, the Inspector visited the new site.

GAS v. ELECTRIC LIGHTING AT DOVER.

At a Meeting of the Dover Town Council last Wednesday, considerable discussion took place in respect of the lighting of the town. The Town Clerk (Mr. E. W. N. Knocker) read a letter from the Dover Electricity Supply Company, stating that they were informed that the Corporation were about to adopt a scheme for lighting parts of the town by incandescent gas-lamps. They trusted this system would not be extended to those streets in which the electric light mains were laid, as the Company hoped in a fortnight's time to quote very favourable terms for the lighting of those streets. Mr. Bradley asked whether the Company would be willing to reopen the question of lighting the streets where their lamps were already erected on the same "very favourable terms." Mr. Lewis was about to speak, when the Mayor (Alderman Pepper) said shareholders in the Gas and Electric Light Companies would take part in the proceedings at their own peril; but he would not prevent them from speaking if they were wishful to do so. The Town Clerk read a letter from the Gas Company, in which it was pointed out that there would be some difficulties in the way of using a test meter in connection with incandescent gas-lamps. Mr. Lewis said if test meters could not be used, the Gas Company could supply what quantity of gas they pleased. Alderman Peake, a shareholder in the Gas Company, said that, "at his peril," he would explain that the consumption of the "C" burner incandescent gas-lamps would be about 4½ cubic feet per hour, and meters might be used. Instead of 15-candle power, these incandescent lamps would give 60-candle power at less cost. Mr. Fry, also as a shareholder in the Gas Company, asked if he might speak on the electric light question without peril? The Mayor said he could not say what the peril was. Mr. Fry said the warning had been put very pointedly from the chair. The Mayor remarked that, if he said shareholders were not to speak, he did not suppose they would take any notice of him. Mr. Fry said he was about to observe that when the Electric Light Company sent a sensible letter like they had done that day, stating that they would be prepared to deal with the question of lighting on favourable terms, the least the Council could do, in the interests of the ratepayers, was to adjourn the consideration of the matter for a fortnight. He would move this. Mr. Mackenzie said he would second it. Mr. Thorpe said it would be as well for the Electric Light Company to get Snargate Street perfected before going further. Lights were often found to be extinguished in that street. Mr. Thorpe remarked that the electric lighting in Snargate Street was a perfect farce. Mr. G. Mowll said arrangements had been made with the Gas Company for lighting the town with incandescent lamps, and the contract had run out; therefore, in his opinion, the matter should go before the Lighting Committee. Mr. Burkett deprecated an adjournment. The Committee had, he said, already decided what portion of the town should be lighted by electricity, and what portion by the incandescent gas system; and the Council had come to an agreement with the Gas Company. Yet at the last moment the Electric Light Company came forward and said they were going to do something which the town did not want, for he was sure they did not require any more electricity yet, particularly after the way in which Snargate Street had been bungled. The Mayor said the Council had made an arrangement with the Gas Company; but before the agreement was concluded, they wanted to find out the minimum consumption of gas per lamp. This the Gas Company appeared unable to state. Alderman Peake said the minimum would probably be taken at 3½ cubic feet per hour. Mr. Brown asked what the Council paid for lamps erected by the Electric Light Company. Mr. Thorpe said they were paying £30 per lamp for seven, fourteen, or twenty-one years. The Lighting Committee were now recommending the Council to light the streets with incandescent gas-lamps, which would be far better than the electric light. After some remarks as to the advisability of leaving up certain gas-lamps, so as to be available for use in an emergency, the adjournment of the subject was agreed to.

THE WELSBACH PATENTS IN GERMANY.

Official Decision in the Nullity Suit.

The decision of the five Judges, sitting in the Nullity Division of the Imperial Patent Bureau of Germany to adjudicate upon the application of ten persons or firms for the quashing and rescinding of four patents held by the Austrian Incandescent Gas-Light Company and the German Incandescent Gas-Light Company, has recently been published. It is a voluminous document, signed by the President of the Court, Privy Councillor Baron von Seckendorff; and it gives a summary of the rulings of the Court which is only intelligible on reference to the specifications, followed by statements of the case on behalf of the plaintiffs and on behalf of the defendant Companies. The conclusion is a clear summing up of the case, with the grounds for each ruling stated in conjunction with it. The following digest is prepared from the official report, which is reprinted in the "Journal für Gasbeleuchtung" for the 18th ult.

The patent rights were originally conferred on Dr. Auer von Welsbach; but they have been transferred by him to the defendant Companies. The first patent, No. 39,162, is dated Sept. 23, 1885. The remaining three are supplementary to it, and are numbered and dated as follows: No. 41,945, Aug. 29, 1886; No. 44,016, Jan. 20, 1887; and No. 74,745, Aug. 15, 1891. On examining the several petitions, it was found that the applications for the annulment of claims 1 and 2 of patent No. 39,162, claims 1, 2, 5, 6, and 7 of No. 41,945, and claims 2 and 3 of No. 74,745, could be taken as one group. These nine claims deal with the material composition of the mantles; and it was asserted that the property possessed by the materials named in the claims, of radiating light when heated, had been known before the statement of Auer's master patent; and further that Auer had been anticipated in applying this property for the production of an incandescent gas-light.

In support of the first contention, numerous quotations from writers from Berzelius onward, but especially from Bahr and Bunsen, were brought forward. These showed that the writers had not only been aware of the incandescing powers of the rare earths, but that Bunsen even differentiated between them, and founded an analytical method for their examination on their incandescing properties. Lime, magnesia, and zirconia had long been used for lighting by incandescence, as in the Drummond light; and since the light-emitting property of zirconia was well known, it was contended that the use of the allied rare earths no longer constituted an invention, especially as thoria was closely allied to zirconia. Their technical use dates from an English patent of Mr. J. S. Williams (No. 225 of 1882), from an American patent (No. 238,400 of 1881), and from a French patent (No. 77,619 of 1867), which referred not only to lime, magnesia, and zirconia, but to the analogous earths, which must be those applied by Auer, and to mixtures of them. The references also show that it was known that the heat of the bunsen flame sufficed to produce their incandescence. The mixtures of earths mentioned by Auer are not molecular mixtures, nor are chemical combinations referred to; and since they are only mechanical mixtures, in which no new substance is formed, it is argued that there is nothing that can be protected, and that the claims, as far as they refer to particular materials for the production of light by incandescence, or to mantles composed of mixtures of materials, should be annulled.

The petition then deals with claims 3 and 4 of patent No. 39,162, claims 3 and 4 of No. 41,945, and claim 1 of No. 74,745. These five claims refer to the method of manufacturing the mantles, and the use of the mantles made by that method. It consists in bringing the materials, in an extremely fine state of division, into a suitable shape for introduction into the flame; and to this end a properly-shaped web is impregnated with the materials, and afterwards ignited, so that an earthy skeleton of the shape of the web remains. This method, it was contended, was used in the production of the "Solar" and the "Lunar" light, and was described prior to Auer's description; it was also described in the English patent of Williams already mentioned. The earlier description of the method, if only with respect to magnesia and zirconia, would make it no invention to extend it to other materials of known incandescent power. Therefore it was argued that the claims in question of the Auer patent should be totally annulled.

But the method should be unpatentable because it does not furnish a result of any technical value. It transpired in 1893 that the Auer Company did not manufacture their mantles in accordance with the patented method, but by one which was kept secret. It appears that the method described by Auer does not provide for the strong ignition which is necessary for the production of a durable mantle. The bunsen flame does not give a sufficiently high temperature for this ignition. Therefore it was asked that the annulment of the claims to the method should be granted.

Finally, the annulment of claim 5 of patent No. 39,162, claim 8 of No. 41,945, and the claim of No. 44,016, was demanded. These ought to be annulled since they refer solely to the technical manipulation for the manufacture, which is insufficiently explained for a workman without inventive ability to carry out. The recovery process described in patent No. 44,016 was asserted to be of no technical value, as it had never been employed.

The petition for the rescission of the patents was based on paragraph 11, No. 1, of the patent law. Since, as above stated, the invention could not be worked as described, it should be without industrial value. Finally, granting the working of the invention, it was argued that it did not occur in Germany, as the impregnating fluid was obtained from abroad. Rescission is further sought because the patentee endeavoured to injuriously affect German competitive industry, and by an unreasonably high price and onerous conditions of sale to injure the public.

The defendants deny the accusations, and ask for the dismissal of the petition with costs. As to the first group of claims, the statement of the petitioners that the power of incandescence of the materials was known, was unimportant, as no single material was patented, but certain indicated mixtures of materials, which were not mentioned in

the references quoted. The merit of the invention depended on the lighting efficiency of these mixtures. But if the published matter refers to mixtures specifically, the annulment should not be granted, as those publications must be read with consideration of the then existing state of knowledge. The statements of prior claimants would not have sufficed for the construction of the Welsbach light. Especially was this the case with Williams's patent, which does not contain any working directions of technical value. Stated with precision, it appears that it was not the rare earths, but the rare metals, that were intended to be used for the actual mantles. Article 39 of this patent should be thus understood.

The mixture of materials not only related to the lighting power, but also to the durability of the mantles. The mantle of the "Solar" or the "Lunar" light was unserviceable, as it fell to pieces on use. With reference to the second group of claims, the defendants say that the process refers not only to the use of a combustible web, but to the method of effecting the impregnation of it. This consists in dipping the web into a solution of the earths, so that a molecular (not in the chemical signification of the word) mixture of the earths completely penetrates the web. The instructions for producing the "Solar" light stipulated for the use of mucilage in applying the lime or magnesia to the web; and the results were not satisfactory. Williams in his process employed thin metal films in place of the earths for the mantles. The assertion that the process was not of practical value should be dismissed, as the strong ignition, though practically desirable, was in no sense essential to the application.

The petition for rescission was unwarranted, as it was not essential for the substantiation of a patent that all the details, but only some of them, should be carried out. This was so, for the mantles in use, as well as those made unjustifiably in competition, were based on patent No. 41,945; but mantles also of different composition were put on sale. The inventions were brought into application in Germany, since the exercising of the process commences at the point where the solution is applied to the web, and does not depend on the choice, purifying, dissolution, or other preparation of the earths used in the mixture.

Reasons for the Decision.

The Auer invention rests on patent No. 39,162, and especially on claim 1 of that patent. It is clearly stated in this that protection is claimed for mantles made of certain mixtures of materials. The plaintiffs have not proved that mantles had been known of these mixtures of materials; and it must be accepted that the exact mixture is of considerable effect and importance, not only for the emitting power, but also for the shape and durability of the mantles. The plaintiffs lay stress on other patent specifications, especially an American one by Khotinsky, which, they state, refers to mixtures of earths for such purposes. But, in comparison, it may be held that a hint on the properties of the earths as materials to be used for mantles may be borrowed from Khotinsky's specification; and it must be granted that such an application of the particular earths could not be protected after publication. Also, that the patent specification was calculated to stimulate further experiments for utilizing that property of the earths. On the other hand, the publication does not anticipate the idea expressed in Auer's master patent, of applying certain mixtures of materials for attaining certain effects. This can still less be granted of another publication brought forward.

The plaintiffs' contention that the mantles manufactured according to claims 1 and 2 of patent No. 39,162, claims 1, 2, 5, 6, and 7 of No. 41,945, and claims 2 and 3 of No. 74,745, have no industrial value, also fails; for the industrial value is not altogether dependent on the particular mixtures of materials being productive of excellent lighting effects and greatest durability of the mantles. It is sufficient if it can be demonstrated that the main object of the purpose aimed at can be attained. Such considerations lead to the refusal of the petition for the annulment of the claims in question.

The second group of claims, which are based on claim No. 3 of patent No. 39,162, refer to the method of manufacturing the mantles. This is described as follows: "Combustible webs of tubular shape are impregnated with compounds which on ignition decompose, with separation of the oxides. Among such compounds are the nitrate and sulphate of the elements specified in claims 1 and 2—that is, magnesium, zirconium, lanthanum, &c.—as well as the nitrates and sulphates of the combinations specified in claims 1 and 2 of those elements. The impregnating is effected by dipping the web in a solution of these compounds; but it may also be effected if the compounds form amorphous, gelatinous, or crystalline deposits." Against these claims, the plaintiffs allege the description of the method for producing the "Solar" and "Lunar" light, as well as the specification of Williams. The "Lunar" light is so far an incandescent light that a body is placed in a non-luminous spirit-flame, and raised by the heat to incandescence. Lime or magnesia deposited on a fine web by impregnating it with a material (such as calcium carbonate) which breaks up on heating, with production of the oxide, forms the body or mantle, which is of conical shape to suit the flame. This process agrees with that in dispute, except that the shape of the mantle is different. But this is unimportant, as evidently its shape must in each case be such that the flame can best cause incandescence of it. Auer also does not restrict himself to the tubular pattern. He speaks of "nearly conical;" and he also reserves other patterns. The essence of the Auer process is that the mantles are produced of the skeleton-like form which readily incandesces by incineration of the web; and this is anticipated by the "Lunar" light. Claim 3 of patent No. 39,162 is therefore, as far as it generally protects the method described, to be annulled. It is also, so far as the use of single elements is concerned, to be annulled. Magnesia is expressly claimed for the "Lunar" light; and it is no invention to replace magnesia by zirconia or a rare earth which had been before used for incandescent lighting, and the incandescing property of which was known.

The case is different for combinations of these elements. Auer's merit is not that he invented the incandescent light, but that he gave it a perfect and practical value, which turned on the discovery of mixtures giving a higher incandescence, and fashioning such mixtures into a suitably durable shape. The Auer mantle, to be of value, must be made durable; and this is effected by the production of welded or shaped structures by heat from the use of certain mixtures. It becomes an invention if the method known in the first place for producing the "Lunar" light when applied to the Auer mixtures of materials, gives a new and greatly increased effect. The same may be said of Williams's specification, which, so far as it is precise, refers to mantles of films of the rare metals. It is only of importance in so far as it refers to impregnating the web with saline solutions, instead of, as with the "Lunar" light, depositing lime or magnesia on it. Auer describes both methods for his process; but, taking into account the description for the "Lunar" light and Williams's specification, neither can be his invention. Claim 3 of patent No. 39,162 must therefore be quashed so far as it places the process in general outlines under protection; but it is upheld as a subsidiary claim to No. 1, in that the inventor secures the right of protection to the process when applied to the mixtures of incandescing materials protected by him.

Claim 4 of patent No. 39,162 can stand, under these circumstances; but claim 3 of patent No. 41,945 is annulled, for it protects mantles formed wholly of thoria, made according to claim 3 of the chief patent. This does not constitute an invention, as the use of single earths, as distinguished from the mixtures specified by Auer, has been already found to have been anticipated. On the other hand, the annulment of the use of thoria alone does not extend to certain mixtures containing thoria. The erasure of claim 3 in patent No. 41,945 necessitates deleting from claim 5 of the same patent the reference to mantles made of thoria according to claim 3, to avoid misconception as to whether or not the annulment extends to the mixture of ceria and thoria.

The third group of claims disputed consists of claim 5 in patent No. 39,162, claim 8 in No. 41,945, and the claim in No 44,016. There is not sufficient evidence brought against the novelty of the auxiliary operations protected by these claims; and the petition for annulment therefore fails.

The petition for the rescission of the patents is not granted. There is no doubt that Auer's invention has been epoch-making in its consummation. It is, however, a matter of indifference that mantles are produced in some cases by other than the protected process, and are dealt in by the Company exercising the patents. It is of no importance for the upholding of the patents that they should be carried out in every detail. That the patents are not exercised in this country has not been demonstrated, but rather the plaintiffs' statement is disproved by their own pleadings. The making of the solutions is not protected, but the manufacture of mantles by their aid; and this manufacture begins with the impregnating of the web with the saline mixtures. The impregnating and preparation of the mantles are undoubtedly carried out by the German Incandescent Gas-Light Company.

The plaintiffs having succeeded only in a few and not very important items of their petition, they will have to bear the official, and three-fourths of the unofficial, costs; the defendants to bear one-fourth of the unofficial costs of the suit.

ELECTRIC LIGHTING NOTES.

The "casting vote" of the Mayor was particularly useful to the adherents of electric lighting in the Eccles Town Council at the last meeting of that body. The Electric Lighting Committee recommended the Council to defer the acceptance of any tender for the construction of electric lighting works until after a Local Government Board inquiry has been held; and with a view to bringing about such an inquiry, it was proposed that application be made to the Board for sanction to borrow £20,000 for the carrying out of the scheme. By taking this course, the Committee had an eye to the killing of two birds with one stone. First, they thought the Council would be able, without further expense to the borough, to ascertain what weight of opposition there is (if any) to the scheme; and, secondly, they would be given the further advantage that, if, in consequence of opposition, the Local Government Board declined to sanction the borrowing of the money, the Board of Trade might then be asked to extend the Provisional Order until such time as the first-named Board would put the Council in a position to proceed. An amendment to the adoption of the report was proposed, its object being to secure an expression of the present opinion of the ratepayers on the subject; but, by the casting vote of the Mayor, it was rejected. A second amendment that the minutes be adopted, without the recommendation, met, by the same means, a similar fate. Then a member moved the adjournment of the debate; but, the Mayor again exercising his prerogative, it was lost. In the same manner, the Committee's recommendation was adopted. With such an equal division of opinion in the Council, it may be questioned whether it would not have been wiser to have submitted the matter to the decision of the ratepayers before taking the step recommended by the Committee.

The resolution passed by the Maidstone Town Council on March 14, 1894, deciding to carry out their Electric Lighting Order by transferring it to a private Company on terms to be arranged with the sanction of the Board of Trade, was again under discussion at the last meeting, on a motion by Mr. Cox that it be rescinded. Among the arguments advanced by that gentleman in favour of his proposal was one that the Corporation could borrow their money at 3 per cent.; and, by spreading the repayments over a period of 30 years, they would only bring the percentage up to £5 2s. 0½d. He considered that they ought not to create another monopoly in the borough, and that the gas and water works ought to be in the hands of the Corporation—his opinion being that electricity and gas could work hand in hand together. The Council were at present paying £2300 or £2400 for public lighting; and about £1000 in the area which would be covered by the electric light. After the motion had been seconded, Mr. Baker expressed his belief that electric lighting in the borough would be a failure. He thought they were well served by the Gas Company, and that, by using the incandescent light, they would obtain everything that could be desired. The debate was continued at considerable length; one of the speakers (Mr. Brownscombe), referring to the control of public works by municipal authorities, stating that he also was prepared to vote for the acquisition of both the gas and water undertakings. The motion was lost by ten votes to twelve.

Canterbury seems to have been captivated by a combined electric lighting and dust destruction scheme upon which Mr. R. Hammond has just presented a voluminous report. The Corporation obtained an Order in 1891; and, as we understand, spent something like £500 in parliamentary and other expenses in connection therewith. But they hesitated to carry the provisions of the Order into effect—possibly considering that the venture was a little too risky. Yet when the Brush Company expressed their willingness to take over the powers granted to the Corporation, the latter imposed so many restrictions that the matter was allowed to drop. This decision seems now to be regarded with satisfaction, as it leaves the way open for the Corporation to come along with an electric lighting scheme—that is, if the ratepayers will consent to it. Mr. Hammond, of course, discourses upon the advantages of municipal rather than private enterprise; and he presumes that the Corporation would be able to borrow at about 3 per cent. all the capital that would be required. He cites the experience of other towns in support of his views as to the desirability of municipalities themselves undertaking electric lighting; and he then proceeds to compare the cost of this system with gas. He calculates that one unit of electricity will supply light equal to 125 cubic feet of Canterbury gas; and he thinks 6d. per unit will compare approximately with gas at 2s. 10d. per 1000 cubic feet—the price charged in the city. Then, if the electricity generated could be utilized for other purposes than that of lighting, he considers it would be possible to "make a handsome profit" out of selling it at 2d. per unit, or equal to 1s. per 1000 cubic feet; and consequently the "advantages which gas derives from bye-products will probably, in course of time, accrue to electricity through bye-uses of the plant. However small, therefore, may be the margin of profit on the works when they are first established, there is good prospect of large profits being made in future years." This is consoling. Mr. Hammond recommends the low-tension system; and the combination of dust-destruction works with those for electric lighting. The outlay required for the complete scheme would be £16,700—*i.e.*, £14,500 for the latter works, and £2200 for the former; and he reckons there would be a net profit of £665 to the Corporation, besides getting rid of the city refuse, which has hitherto been dealt with in a laborious and costly way. With regard to the public lighting, the present cost of gas is £189 15s.; and Mr. Hammond thinks it could be done for £56 15s. less per annum by the substitution of two 16-candle power incandescent lamps for each gas-lamp, with the addition of four arc lamps at certain important points. This is a very attractive picture as it stands. We shall be curious to see with what reception the scheme meets when it comes before the Town Council.

The latest ebullition of the St. Pancras Electricity Department is the issue of their Chief Engineer's "Regulations for Wiring Contractors in Connection with the Supply of Electricity for Lighting and other Purposes." These regulations—consisting of no less than 48 items—were submitted to the Vestry on Wednesday last for adoption. An important regulation, in view of the late explosions, is that enforcing that "no metal framework of any fittings shall be used as part of the electric circuit, or be in contact therewith; and no connection with gas or water pipes, or 'earth' allowed." It is further stipulated that "combination gas and electricity fittings must not be employed, except by the special consent of the Engineer, and under such precautions and conditions as he may direct." The Vestry undertake to inspect and test completed wirings free of charge; but all subsequent tests, if necessary, must be paid for at 10s. each. Consumers will be delighted to hear that, "should the insulation at any time fall below the standard specified, the Vestry may, after due notice, discontinue the supply of electricity to the premises." Storage batteries can only be constructed with the sanction of the Engineer; and "the Vestry do not undertake any responsibility for the proper execution of any work on consumers' premises, nor for any loss or damage which may be occasioned by fire, or any accident arising from the wires, fittings, or other apparatus within the buildings." Consumers, therefore, must bear the whole risk of the probability of fire from fusion; while on their part the Vestry do not even undertake to guarantee an uninterrupted supply of current!

The Swansea dust-destruction and electric lighting scheme has been more or less sharply criticized in our columns and elsewhere. One of its latest opponents is Mr. L. de Fonblanque, the Secretary of the Incandescent Gas-Light Company, Limited. Of course, he may be regarded as a party interested on the other side; but in a recent letter to a West of England paper, he not only attacked the scheme as a lighting project, but questioned the portion of it which is specially dear to some of its partisans—the dust-destruction section. Mr. De Fonblanque remarks that sanguine members of the Swansea Corporation anticipate that the electric power can be supplied by means of the dust-destructor plant at 1d. or 1½d. per unit; and he adds that, if this can be done in Swansea, it is somewhat remarkable that it has never occurred to any other corporation or company to supply it at an equally low rate. We think with him that there are doubtless good reasons why this has not yet been done. He goes on to show that, if the wonderful idea of supplying electric current at 1½d. per unit were ever to be realized, the cost of the power would be more than twice the cost of gas to obtain the same amount of light by the Welsbach system. Coming to the scheme itself, he says: "Can its promoters seriously advance the suggestion that, by means of the dust-destructor, or any other scheme, the electric current can be supplied at 1½d. per unit? There is no magic in the dust-destructor; and taken at its best, it is merely a substitute for fuel. Therefore, according to the argument of the promoters of the Swansea electric lighting scheme, the difference between their 1½d. and the 5d. or 6d. which the large electric lighting corporations in London are obliged to charge must be due to the cost of fuel. As a matter of fact, the cost of fuel in a well-managed concern rarely exceeds one-sixth of the selling price. Therefore, putting fuel aside, or supposing it were to be obtained for nothing by means of the dust-destructor, the London corporations could supply at, perhaps, 4d. instead of 5d.; but not even the optimistic views of the promoters of the Swansea scheme can anticipate incurring no cost on account of the dust-destructor plant." He adds that these are points upon which ratepayers should satisfy themselves thoroughly before they sanction the expenditure of a very large sum of money on such a scheme; and most of our readers will doubtless agree with him. While on the subject of Swansea, we may mention that Mr. W. H. Preece, C.B., who, it may be remembered, promised a few weeks ago (*ante*, p. 138), out of pure patriotism, to go thoroughly into the Corporation's scheme, has made his report. He says: "I have carefully considered all that has been said against the proposals of the Town Council; but I have come to the conclusion that the Corporation would be quite safe in adopting Mr. Manville's several recommendations on their own individual intrinsic merits. Each part of the so-called triple scheme is practical and promising. They mutually support each other for the benefit of the ratepayers. The price charged for the light could be reduced to a figure below that of any other town in the United Kingdom. The demand for the light must consequently increase; and the number of lamps fixed would soon exceed the comparatively small number proposed to be installed by the Town Council. Swansea would become a pioneer town. Its inhabitants would benefit by having better transit, purer air, and cheaper light. Its finances would be improved by the profits that would arise from the successful administration of those purely local and municipal industries which the Legislature has decreed should be in the hands or under the control of the ratepayers themselves."

A PROFIT-SHARING EXPERIMENT AT BATLEY.

The system of profit-sharing is about to be introduced into one of the largest concerns in the heavy woollen district—Messrs. J. T. & J. Taylor, woollen manufacturers, Blakeridge and Cheapside Mills, Batley, where nearly 700 people find employment. The firm was established more than half a century ago. Mr. T. C. Taylor, the principal, has long had a desire to give to the rank and file of his workpeople an interest in the fortunes of the business; but up till recently, circumstances have prevented its realization. A beginning was made four years ago by the admission of the chief heads of the business—followed later by that of the foremen and chief clerks—to a share in the profits. The scheme provides that, in the firm's annual stocktaking, any balance that may remain after due allowance for depreciation, &c., and the payment of 4½ per cent. interest on capital, shall be apportioned between capital and labour, according to their respective amounts. Thus, if the capital engaged in the business were £50,000, and the wages paid in any given year amounted to £25,000, and if the divisible surplus in question were £3000, capital would take £2000, and labour £1000—that is to say, in addition to 4½ per cent. interest, capital would receive a dividend of 4 per cent. and labour a dividend of 4 per cent. likewise, which, to a worker earning £1 per week, would mean a bonus of upwards of £2. But the aim of the promoter being, through the means of the bonus on labour, gradually to transfer the ownership of the business to its workers, the bonus will be given not in cash, but in the form of fully-paid shares in the Company into which the firm is going to be converted for the purpose. These shares will be saleable only among the employees in the concern. Every person working for the firm during the whole of any given year will be entitled thus to participate in that year's profits; and any such share or shares as may be allotted will the following year entitle the holder to payment in cash of any dividend that may be declared. It will be observed that such parts of the total wages paid as are earned by workers who do not remain the whole year will not confer bonus on the individual workers to whom those wages were paid; but nevertheless the whole wages paid during the year will rank along with capital for dividend as above. The amount of dividend thus unappropriated to individual workers will be carried to a special fund for the general benefit of the workers, of which the firm will render them an annual account.

On the evening of Saturday, the 1st inst., Messrs. Taylor entertained the whole of their workpeople to tea in the Victoria Hall, Batley; and at the social gathering which followed, Mr. T. C. Taylor took the opportunity of explaining the scheme, which came into operation on the 1st ult.

Central Station Electric Lighting in France.—In an early issue in the present year, "L'Industrie Electrique" gave their customary table showing the progress of central station electric lighting in French provincial towns. This time last year, the number of these stations was 328; by the close of 1895, it was 438. Of these, 378 furnished returns as to horse power; the highest figures being for steam, and the lowest for petroleum. Producer gas is used at six stations, furnishing 206-horse power; and ordinary gas at 13 stations, giving 1605-horse power.

The Leeds Gas Workers and their Wages.—The conference which the Gas Committee of the Leeds Corporation agreed to hold with the representatives of their workmen on the subject of the demand by the latter for an advance of wages, took place last Tuesday, when the whole of the points at issue were thoroughly gone into. With the view of showing that the Leeds gas workers are as well treated as those in other towns, a mass of information concerning the conditions of labour in various gas-works was placed before the delegates. These particulars are left for the consideration of the men; and, on the other hand, the views of the workers, as expressed by their delegates, are to be brought at an early date under the notice of the Gas Committee.

Widnes Corporation Gas and Water Works.—The Widnes Corporation Year Book for 1896 has been issued. Referring to the Corporation properties, some information is given respecting the gas and water works. The gas-works, it states, were acquired by the Local Board under the provisions of the Widnes Improvement Act, 1867; and they have been almost wholly reconstructed and greatly enlarged. The price of gas to consumers below 3 million cubic feet per annum is 2s. per 1000 feet, less 2d. per 1000 feet discount; to consumers above 3 million feet, 1s. 10d., subject to the same discount; and per prepayment meters, 1d. per 30 cubic feet consumed, including use of meter and fittings. As to the water-works, the sources of supply are the pumping-stations at Stockswell, erected in 1868, and Netherby, erected in 1877, and extended in 1892.

METROPOLIS WATER SUPPLY.

The Report on the East London Water Inquiry.

The report of Colonel W. Ducat, R.E., and Dr. F. W. Barry, the Inspectors appointed by the Local Government Board to inquire into the alleged failure of the water supply in the district served by the East London Water Company in the summer of last year, has been presented to the President of the Board. It will no doubt be remembered that the inquiry was held in the Hackney Town Hall at the beginning of October, and extended over five days. The report of the proceedings will be found in the "JOURNAL," Vol. LXVI., pp. 743, 792. The Inspectors were instructed to investigate the following matters: (1) The circumstances connected with the deficiency of water supplied in the Metropolitan area comprised in the districts of the East London Water Company and the Leyton District Council; (2) the effects of the deficient supply as regards the public health; and (3) the means which should be adopted with a view of preventing a recurrence of any such deficiency. The Inspectors deal at some length with each of these subjects, and close their report with the following brief summary of the results of their consideration of the evidence laid before them:—

1.—That the scarcity of water in the East London Water Company's area during the summer of 1895 was due to the following causes: (*a*) Exceptional waste, beyond the undue waste of ordinary years, of water owing to non-repair of fractures in the consumers' pipes brought about during the unusually long and severe frost of the previous winter, and to excessive garden watering during the drought in May and June. (*b*) Decrease in the volume of the River Lea due to the unprecedented drought which occurred during the first six months of 1895. (*c*) Means of storage possessed by the East London Water Company inadequate to enable them to meet the combined waste and deficiency of water noted under headings (*a*) and (*b*). We would also note under this heading that, in our opinion, the inconvenience experienced by consumers was much aggravated by the want of proper means for domestic storage of water.

2.—That, although the scarcity of water undoubtedly gave rise to considerable inconvenience and hardship, there is no evidence to show that it had any appreciable deleterious influence upon the public health within the area of the East London Water Company.

3.—(*a*) That steps have already been taken by the East London Water Company which should, in our opinion, afford sufficient storage of water to meet any deficiency in the supply of water within their district for many years to come. (*b*) That, for the protection of the consumer against unavoidable temporary intermissions of the supply, we consider that there would be distinct advantage in having properly-designed means for storage of water in houses.

MANCHESTER CORPORATION WATER SUPPLY.

Reduction in Charges—Settlement of Important Financial Questions.

The Water Committee of the Manchester City Council, finding themselves in a much more satisfactory financial position than they could have anticipated, have been considering the question of the charges for water; and at last Wednesday's meeting of the Council, they reported that they had come to the conclusion that the charge for baths in weekly houses should be reduced from 10s. to 7s. 6d. each per annum (subject to the usual discount of 20 per cent. when paid in advance, as heretofore), and that the charge for water supplied for domestic purposes beyond the limits of the city should be based upon the net annual or rateable value instead of the gross value of the property supplied; these arrangements to take effect from the 1st of April next. Sir John Harwood, in moving the adoption of the Committee's proceedings, said that three years ago, when making a statement with regard to the charges for water, he mentioned that the Committee had not then completed their financial arrangements. They had at that time several unsettled disputes with regard to land. Since he last had an opportunity of addressing the Council, the Committee had settled about 30 claims, not of very large dimensions, but very intricate and important, extending over a period of seven years. There was one claim that came in for a sum of £109,269. The preparation of evidence to meet this claim involved very hard work on the part of the Committee; and, on arbitration, the sum awarded was £16,512—a difference of £92,757 between the claim and the award. Another claim was for £12,825; and the sum awarded was £2705—a difference of £10,120. There was also the question of the sinking fund, which, in respect of the Thirlmere works, had been extended from 60 to 70 years. The interest under the old arrangement would have amounted to £112,000 a year, added to the expenditure on the Thirlmere works. Taking it upon the annuity principle, which they had now succeeded in adopting, the amount would be £98,500 a year, so that the alteration made in connection with the sinking fund alone saved the citizens, for the next 30 years, practically £14,000 a year. These matters had brought the Committee into a better position with regard to their finances. He told the Council three years ago that they had assimilated the old works at Longdendale and the new at Thirlmere with regard to interest and sinking fund; and the Committee had now been able to arrange this financial position so that they were able to keep their promise and to take 2s. 6d. off the charge for baths. There was a growing feeling in Parliament which no experienced man could ignore, that these rates should be assessed upon the net and not upon the gross annual value. The Committee had recognized this, and had tried to meet it. There were 38,000 people outside the city paying upon the gross annual value, while inside the city the persons assessed paid on the net annual value. Of those 38,000, 20,000 resided in Pendleton and Broughton, and were practically, therefore, in their midst; and the reduction would be a great satisfaction to them. The difference to the Committee would be about £6000 a year; and it was more than gratifying to him and to his colleagues on the Committee that they were able to take this step, and, by the readjustment of their financial position, to pay their way without any increase or contemplated increase of rates whatever. Another thing the Committee would have to consider would be a substantial reduction in the charge for water for trade purposes. Sir B. T. Leech seconded the motion, which was passed.

GRAND JUNCTION WATER-WORKS COMPANY.

A Special General Meeting of this Company was held last Wednesday, at the Offices, South Molton Street, W., to consider the proposed Bill to "authorize the construction of new reservoirs at Staines, and other works for affording an additional supply of water for certain districts north of the River Thames, and for other purposes." Mr. F. TENDRON presided.

The SECRETARY (Mr. Goodwin) read the notice convening the meeting.

The CHAIRMAN remarked that the Bill—which he hardly supposed they would wish to have read—commenced with a reference to the Royal Commission which was appointed a few years ago, to ascertain as far as they could whether the water within the watersheds of the Rivers Thames and Lea would be sufficient to meet the requirements of Greater London and the Metropolis up to a period extending over nearly forty years. A good deal of evidence was submitted before that Commission; and there were various proposals for embanking the river in different parts, and so keeping additional supplies. But no scheme met with the approval of the Commissioners, except the one prepared by the late Mr. Fraser and their present colleague Mr. Hunter. That was a scheme for impounding the water at a certain distance from London, and keeping it in reserve; because at certain times the river flowed in far greater quantity than was required for navigation or pleasure purposes. At other periods, the quantity was limited; but by having storage reservoirs, there would be ample supplies for the time when it was not desirable that the flow of the river should be checked. Subsequent to the report of the Commission, the various Companies met together; and at one time, it was supposed that the whole of those who took their supplies from the Thames would join in carrying out the scheme. But some of them preferred making their own reservoirs. They desired to comply with the recommendations of the Royal Commission as far as they could; but they preferred carrying them out in their own way. Neither he nor his colleagues had any word of reproach to address to the Southwark and Vauxhall, the Chelsea, and the Lambeth Companies, who one after the other withdrew from the scheme; nor had they any to utter to the East London Company, who, after supporting them for a long time, finally made up their mind to withdraw. But when they thought the matter had fallen through, and that they would not be successful in obtaining a joint application, the New River Company came forward, and entered into an arrangement with the West Middlesex Company and themselves whereby the main features of the original scheme could be carried out; and the Bill now before them was promoted to give the necessary powers to the three Companies to carry it out. The main work would be the construction of a very large reservoir near Staines, but taking in the water from the river above that place. This reservoir, capable of holding 2½ million gallons, would be divided into two parts, and would be supplied by water taken from a conduit that would lead from the river a few yards distant from Bell Weir. The conduit would flow the whole way to the Grand Junction works, or to some reservoir to be constructed on land to be obtained near them; and it would furnish a daily supply for their Company, as well as for the West Middlesex and the New River Companies. When the river was at its normal flow—which might be taken at anything from 500 to 800 million gallons a day—the water would pass by gravitation to those works; and the reservoirs would be kept charged. Then during the short periods of flood, or the still shorter periods of drought, the water would no longer pass into the conduit from the river, but would flow into it from the reservoirs; and so the normal supply would be kept up. The Board contended that the proposed scheme would not only be an advantage to the public, in giving them water from a better part of the river than the present supply was obtained from, but that the condition of the river itself would be greatly improved by not having so much water taken from it during the times of drought; and certainly it could be no disadvantage to the inhabitants of the country above Staines to have water taken from the river during the time when it was passing at its normal flow. Then the Bill provided that Directors of each Company should be selected to represent the joint interest, and that special accounts should be kept and audited; and it also stipulated that each Company should be entitled to one-third of the water, and bear one-third of the expense of construction and maintenance. Should one Company take less than one-third of the water, that was immaterial; but if, after a time, any one of the Companies gave notice to the others that they did not require so much, the remaining two Companies might divide it between them, or one of them might take the whole of the water not required, in which case the proportion of the payments would be altered relatively to the water consumed. There was also an arrangement for the appointment of an Arbitrator in the event of any difficulty or difference of opinion arising between the Companies; and the ordinary clauses were inserted. He supposed that what the proprietors after all cared most about was what they would gain by the construction of the proposed works. The main advantage they would get was the consolidation of their position—the strength it would give to the Companies, and the favourable opinion which, he trusted, would be formed by the public, and also by Parliament. It threatened for the moment a loss to them; because they could for some time be only receiving water as before, and yet they would be put to the additional expense of their share of the interest on the money to be raised by a joint committee, on the guarantee of the three Companies. Therefore they had to consider that their Company would have to bear their share of one-third of the money required to meet the interest on the new capital, and also one-third of the maintenance and general charges. The Bill gave ten years for the construction of the works, and seven years for the purchase of the land. He did not say they would be so long purchasing the land and constructing the works; but they would be a certain time, and this must elapse before they had the interest to pay or the charges to meet. Still they had to consider that it would be a positive charge on the maximum 10 per cent. shareholders of their Company. They must know what they were doing, and see whether the advantages they were to get would compensate them for the apparent loss. Of course, the idea was that

ultimately they would not lose at all or feel the loss, because of the large increase of the population immediately outside London, which would provide them with the money necessary to meet the interest and charges without affecting their present dividend. But he wanted them to see clearly, and the public to understand, that the Directors were advising the proprietors to pass the Bill because they considered it the duty of the Company to make adequate provision for the supply of their district in the future. The Board felt that the proprietors would voluntarily accept the possibility of a reduction of dividend sooner than fail in their duty; and it would be hard for their opponents after this to say that the shareholders took a short-sighted view of their own interest, or that they utterly disregarded the welfare of the consumers. He then moved that the Bill proposed to be introduced into Parliament be approved, subject to such additions, alterations, and variations as Parliament may think fit to make therein.

Mr. SPICER asked for some information with regard to the estimated cost of the works; and how it was proposed to raise the money.

The CHAIRMAN replied that the estimated cost was £900,000, everything included. He wished to give Mr. Hunter an opportunity of correcting him, and saying if he held to the estimates which had been prepared by him and his colleague Mr. Middleton, because it was a serious matter. The joint Companies would have to apply to Parliament for power to raise £1,000,000; and it was thought that this might be raised by 3 per cent. debenture stock, and that such stock would command a premium. Of course, Parliament would arrange the conditions under which the stock would be issued.

Mr. J. SLATER thought the Chairman had made a very able statement; and he was sure the proprietors were glad that the New River Company and the West Middlesex Company were parties with themselves to the scheme which had been explained to them. Every precaution must be taken to make their position sound; and he thought the Board were taking very useful steps with this object. They could not allow the London County Council to go on chaffing them about providing an inadequate supply without proving to all reasonable people that it was their determination to make their supply as full and as reliable as possible. The idea of having large storage reservoirs was an admirable one, as it would enable them to take advantage of the enormous quantity of water going down the river at certain times, and to slacken their hands when there was a scarcity of water. It was a common-sense proposal; and he believed it would be of benefit to the whole community if carried into effect. He could not understand why they should be worried and harried by the County Council. He wished to call attention to the fact that the other day Mr. Stuart referred to the Water Companies as the "enemy." He said: "Put a bold face to the enemy." That was a scandalous remark for a public man to make, and especially an educated man like Mr. Stuart. Instead of being the enemies, they were the friends of the public; and he thought the Water Companies could say that they had, without many lapses, always maintained a good reputation. When the County Council wanted to spend money, they could draw on the ratepayers; but the Water Companies had to take it out of the pockets of their proprietors. He was not complaining about paying his share; but he thought these were facts that should be remembered, when they heard certain members of the County Council taunting them about not doing more. At any rate, he believed it would be a long while before the Council were able to do better than the Companies. He regarded the scheme now before them as a well-thought-out one; and he hoped his fellow-proprietors would approve of it, and that they would be able to command sufficient influence in the House of Commons to get it carried through.

The resolution, having been duly seconded, was carried unanimously; and the proceedings then terminated.

TEIGNMOUTH WATER SUPPLY.

A scheme for providing a constant water supply for the town of Teignmouth has been prepared by the Surveyor to the District Council (Mr. C. Jones). At present there are three sources of supply—viz., a well at Mylor, the Coombe Brook, and a spring at Landscove; and the water is divided, for purposes of distribution, into a high and a low level supply. This Mr. Jones considers to be unsatisfactory; and though, under the meter system and with attention to the prevention of waste, the actual consumption is only 12 gallons per head per day, he is of opinion that the solution of the difficulty of short supply in dry seasons is to be found in a development of the present sources, and a re-arrangement of the system of distribution. For this purpose he recommends as follows: (1) That the Hazeldown reservoir should be made water-tight and covered. (2) That the Landscove reservoir should be covered, and fitted with floating outlets. (3) That the mains should be re-arranged so that the pumps will deliver direct into the Hazeldown reservoir; and a new 4-inch main laid in the new road from the Exeter Road to the Buckeridge Road. (4) That the main water-meter should be duplicated to register the consumption in the high and low levels and in Shaldon. (5) That the Deacon waste-water meter system be extended to the high level and Shaldon. (6) That existing filter-beds at Coombe should be reconstructed, and an additional one built. (7) That the defective and worn-out valves should be replaced, and new ones provided for inspection purposes and the concentration of the pressure in case of fire. By reconstructing the Coombe filter-bed, and providing an additional one, double the quantity of water can be passed. There does not, says Mr. Jones, appear to be the slightest doubt that, if the system of supply is altered in the way suggested and efficiently administered, a constant service can be maintained for some years to come. The whole of the recommendations would necessarily form part of a larger scheme; and it would not be a waste of time or money if the results should not come up to expectations. Without pledging himself to details, he estimates the cost roughly at £4000. The report was laid before the Council last Tuesday; and it was decided to consider it in Committee. Several members expressed great satisfaction with the prospect that, by the adoption of the recommendations, and a careful husbanding of existing resources, the provision of a larger scheme, costing £20,000 or £30,000, might be deferred for twenty years.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The community of Dunfermline, or such of their number as were privileged to record their votes on Thursday last on the question of whether they should adopt the Burghs Gas Supply (Scotland) Act, 1876, have answered in the affirmative. The full municipal constituency of the burgh numbers 4199; but on the special poll which it was necessary to make up, there were only 3436 names. Even this number was, however, far above requirements, as only 731 recorded their votes. Of these, there were 466 for, and 265 against, the adoption of the Act—giving a majority of 201 in favour. An absolute majority suffices to either adopt or reject; and thus the question is settled in favour of proceeding with further negotiations, the Act being now actually adopted. The smallness of the vote shows that little interest was taken in the business; and probably those who put the burgh to the cost of obtaining the opinion of Counsel and taking a plebiscite, will be sorry for what they have done, as nothing has been gained by their action. The result of the voting was formally announced at noon on Friday by Provost Walker, who had about as meagre an auditory as possible; there being only present to hear him one magistrate, the Town Clerk, and the Burgh Officer. An analysis of the voting shows that, in all the districts of the town, the action of the Council was supported; so that it cannot be said that the adoption of the Act is the doing of any one class in the community. Active negotiations with the Dunfermline Gaslight Company will now be entered upon.

The Hawick Gaslight Company have agreed to pay the Town Council £35 a year as way-leave for the use of the streets in laying pipes. At the same time, the Company discontinue the practice of supplying free half of the gas consumed in lighting the Town Hall clock. Their contribution to this object amounted to about £8 15s. a year; so that the town are gainers by the new arrangement to the amount of nearly £26 per annum. The Council agreed to purchase the meters they use from the Company, at the price of £30; the original cost being £50. The Company cannot be said to have acted in a niggardly way with the Council, though one of the councillors thought fit to use that expression with regard to the arrangement about the Town Hall clock.

A special meeting of the shareholders of the Bo'ness Gaslight Company was held on Monday, to consider a proposal for the extension of the plant, and the formation of the Company into a limited liability concern, in order to raise the additional capital which will be necessary. The consumption of gas is rising so fast that extensions are urgently required. It was resolved to convert the Company into a limited liability one, and to proceed with the construction of a 60 feet new gasholder, a tar-tank, and a governor, the estimated cost of which is about £4000.

The Corporation of Kilmarnock have this week accepted the offer of the Whessoe Foundry Company, of Darlington, to construct for them a telescopic gasholder, at the price of £2647.

The Coatbridge Gas Company have, as usual, paid the maximum dividends of 10 and 7 per cent. for the past half year on their old and new stocks respectively.

It is reported that the revenue of the Dundee Corporation Gas Department for the nine months ending with January, amounted to £42,725—an increase as compared with the corresponding period of the preceding financial year of £1054. The revenue in the Electricity Department was £2764—an increase of £610. During January, 383,654 cubic feet of gas were consumed in the public lamps, at a cost of £607; while in the same period, the four arc lamps consumed electric current to the amount of £19.

The Gas Committee of the Dundee Corporation have this week accepted a tender for 100 tons of sulphate of ammonia at £8 2s. per ton, in buyers' bags.

Regarding the fire in the Brechin Gas Company's works on the forenoon of Saturday last, referred to in my last "Notes," very contradictory accounts are given. Some say it occurred when the hydraulic main connected with the oil-gas plant was being cleared of tar; and others, that it was the ordinary hydraulic main which was being dealt with. If the oil-gas plant was being properly worked, there should be no tar in it; and so the probability is that it was the coal plant which was affected. Whichever it was, the occurrence would seem to have been caused by a deficient seal in the hydraulic main; for it is said that the flame shot up an ascension-pipe, along the hydraulic main, and down to a barrel-cart which was receiving the tar. The cart exploded; and the contents took fire. There was a good deal of damage done to the retort-house, the roof of which was considerably shattered. It is singular that such an accident should have occurred at Brechin, which is only a few miles distant from Forfar, where there was one almost similar.

Brechin has another call upon me this week. At the end of last year, the community held an indignation meeting regarding the quality of the gas which was being supplied by the Gas Company. Among other resolutions adopted, was one agreeing that the charges of the Gas Company for gas should not be paid except under deduction of 33 per cent. As might have been expected, the resolution was not carried into effect—as, indeed, it could not be, because the persons objecting to pay could never have proved, in the absence of analysis, that they had received poor gas, and for other reasons. But several of the leaders of the meeting have endeavoured to act upon it, impracticable though it be. The Company have accordingly taken action; and the other day Provost Vallentine, Mr. D. C. Knowles, and Mr. A. Phillip received letters from the Manager (Mr. J. B. Terrace) to the effect that, at a meeting of Directors, it had been unanimously resolved that, failing payment in full within 24 hours, their gas supply should be cut off. On receiving these letters, Mr. Phillip, acting for himself and the others, went to Forfar, and presented petitions to Sheriff Robertson craving interdict until parties had been heard, and lodging in the hands of the Clerk of Court the amounts demanded by the Company. The Sheriff granted interim-interdict, and ordered the defenders to lodge in the hands of the Clerk of the Court, within four days, notice of appearance, if they intended to show cause why the prayers of the petitioners should not be granted. On Saturday afternoon, the interdict was served upon

Mr. Terrace, the Chairman, Deputy-Chairman, and one of the Directors. The interdict was, in due form, served upon the Company just in time to prevent cutting-off operations being carried out. The case was called before the Sheriff on Thursday, when Mr. Thomson, the Solicitor for the Company, stated his consent that the interim interdict should be continued; and time was given for the parties to make up a record. Now it may not be out of place to point out to the Company that their power to cut off gas supply will depend upon their statutory position. If they are not working under a statute, their only remedy is by a civil action. But, of course, the Company will be sufficiently informed of these matters by their legal advisers.

In order to avoid the possibility of a breakdown in the electric light supply in Dundee, such as happened on the 21st ult., when consumers were without current for five hours, the Gas Committee of the Corporation have resolved to fit up a steam engine and pump, which will provide a third means of supplying the boilers with water. They have found that nobody was to blame for the occurrence; but that it was a pure accident.

The Corporation of Aberdeen on Monday adopted the recommendation of the Gas Committee to reduce the price of electric current from 6d. to 5d. per unit. They also resolved to visit and inspect both the gas-works and the electric lighting station. The event came off on Wednesday afternoon; and the Councillors expressed themselves as highly satisfied with all they saw.

The Sub-Committee of the Glasgow Watching and Lighting Committee who visited Edinburgh on the 30th ult., to see the working of the electric lighting installation there, have reported that they found that the street lighting of Edinburgh is much better than in Glasgow; and that this result has been obtained by a more judicious employment of the light. They recommend that the matter be remitted back to them to consider and report as to what measures are necessary to improve the electric lighting of the streets of the city, with power to confer with the Electric Lighting Committee of the Corporation. They also strongly recommend that the Electric Lighting Committee appoint some of their members to co-operate with the Sub-Committee in further investigation. The report has yet to be considered.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 8.

Sulphate of Ammonia.—There has been a steady market throughout the week; and, at the close, quotations have improved to £8 7s. 6d. to £8 10s. per ton f.o.b. at the ports. The orders for February delivery are largely in the hands of speculators, who, the month being still young, seem inclined to take their chance of securing their requirements later. But the heavy deliveries in January left makers fairly comfortable; and as February deliveries may be expected to be on a similar scale, it is quite possible that the hands of buyers may be forced, and that there may be some advance. Meanwhile, consumers are being deterred from anticipating their requirements by the low prices which are being quoted for forward delivery; and it is to be feared that the low quotations in question are being made with the object of keeping consumers and the market quiet.

Nitrate of Soda.—The market for nitrate of soda is decidedly firmer; the combination of producers being now practically effected. The combination contemplates the shipment of about 1,100,000 tons per annum, in order to maintain the price of 6s. per cwt. f.o.b. on west coast, equal to about 8s. 9d. per cwt. on present freights and exchange delivered U.K. Should the price advance beyond 6s. per cwt., it will be for the Committee to consider the advisability of increasing the output. Meantime, the value of due cargoes of ordinary quality is about 7s. 10½d. per cwt.; while for shipment 8s. per cwt. is being paid. On spot, the value is 7s. 10½d. to 8s. per cwt., according to quality.

LONDON, *Feb.* 8.

Tar Products.—The improved condition of carbolic acid continues. There is, at the moment, an apparent scarcity of it; and stocks both in makers' and consumers' hands are said to be extremely low. The continuous increase of carburetted water gas, and the high temperature at which carbonizing is now conducted, are undoubtedly telling their tale, in decreasing the production of tar, and particularly of carbolic acid. Nineties benzols are weaker; while for 50's, there is apparently no inquiry at all. Solvent naphtha is moderately steady; but the fall in the value of 50's benzol is sure to influence it. There is a good demand for naphthalene; but no improvement in price. Anthracene is steady, with fair inquiry. For pitch, there is much more interest. After one or two months of absolute neglect, there has suddenly come upon the market a good demand, which is likely to firm this article.

Prices obtaining during the week are: Tar, 18s. 6d. to 24s. Pitch, 33s. west coast; 35s. east coast. Benzols, 90's, 2s.; 50's, 1s. 9d. Solvent naphtha, 1s. 3d., home market; 1s. 4½d., for shipment. Toluol, 1s. 7d. Crude, 30 per cent., naphtha, 9d. Creosote, 1d. Naphthalene, pressed, 42s. 6d.; drained, 27s. Cresylic acid, 1s. 1d.; crude, 10½d. Carbolic acid, 60's, 1s. 10½d.; 75's, 2s. 2½d. Anthracene, "A," 1s.; "B," 10d.

Sulphate of Ammonia does not advance in value, although very considerable business is being done. It is felt that sulphate cannot improve until a better feeling exists in the nitrate market. To-day's value may be taken as £8 5s., Beckton terms; and £8 7s. 6d. to £8 8s. 9d., less 3½ per cent., at all ports. Gas liquor is offered at 6s. to 7s. per ton.

Entertainment to Messrs. Richmond and Co.'s Workmen.—On Saturday, the 1st inst., Mr. E. W. T. Richmond, the Managing-Director of Messrs. Richmond and Co., Limited, entertained at tea, in the Drill Hall, Warrington, the whole of the employees, many of whom were accompanied by their wives and friends. At the conclusion of tea, and before the tables had been cleared, Mr. H. E. Ransome proposed a vote of thanks to Mr. Richmond, to whose generosity they were all, he said, indebted for that evening's enjoyment. The vote was passed with much enthusiasm. Mr. Richmond, in reply, referred to the prosperity which had attended the operations of the Company; and he concluded by wishing long life, health, and prosperity to their friends and visitors. The proceedings closed with an entertainment.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—No specially new feature can be reported in connection with the coal trade of this district; the only change, if anything, being perhaps a further weakening tendency in prices, although quoted list rates remain without alteration. All descriptions of round coal still move off slowly, with many pits not working more than four days per week. To effect clearances in some of the inferior qualities, excessively low prices are taken; while the better descriptions of round coal are barely maintaining late rates. It is exceptional where more than 10s. per ton is being got for the better qualities of Wigan Arley; with Pemberton four feet and seconds Arley, about 9s. to 9s. 6d.; common house coal, 7s. to 7s. 6d.; and inferior descriptions of round coal ranging from as low as 5s. 3d. and 5s. 6d., which is occasionally taken on special orders for shipment, to about 6s. upon ordinary inland sales. Engine classes of fuel move off moderately; but supplies are rather more plentiful in some quarters. Prices are not more than maintained, at about 3s. to 3s. 6d. per ton for common, to 4s. 6d. and 4s. 9d. for the better qualities; anything above this being only got in very special cases.

Northern Coal Trade.—There is a slight improvement in the trade of this district, though the working of short time is still far too common—especially at the steam-coal collieries. Best Northumbrian steam coals are quoted at 7s. 9d. per ton f.o.b.; but with the expectation of fuller trade a little later, there is a higher price—up to 8s. 6d. per ton—asked for coals to be delivered over the season. Second-class steam coals are about 7s. 3d. per ton f.o.b. for prompt delivery; and steam smalls are 3s. 6d. per ton generally, the short-time working at the pits having made this class of fuel a little scarcer. Manufacturing coals are in rather better demand; the working at the shipbuilding yards being more regular, and at other factories there is also a brisker coal consumption. Gas coals are steadily sold; and the deliveries by sea are large though not at the highest point, while the requirements of local gas-works are steadily maintained. Prices show no great variation from those last quoted, but there is a good deal of negotiation going on for some of the first contracts for export. One of the chief of these is that for the Stockholm district; and it is expected to be decided in a week or two. The general idea is that the rate will not very much vary from the very low rate that was accepted a year ago. Still, the Durham coal trade would be affected for the better in all its branches more or less if the activity in the iron trade increased; and this may induce some of the collieries to ask higher prices when contracts are for long periods. In the coke trade, the market is very steady, and there is a larger quantity of coke being sent to the north-western blast furnaces; so that the trade is active, and the price of best blast-furnace coke is well maintained. For shipment, 14s. 6d. is about the current quotation; but in one or two instances producers ask 14s. 9d. and 15s. per ton, and for long contracts the range of prices is rather difficult to determine. Gas coke is now being rather less largely manufactured; and the shipment continues good, though the household consumption is falling off in some parts. There is no alteration in the quoted prices of gas coke this week; but much of the delivery is on long contracts for shipment for cement factories, the rates for which do not vary.

Scotch Coal Trade.—The coal trade in Scotland continues in an unsatisfactory state, with stocks still accumulating. Steam coal is being pressed; but the price remains unchanged. Ell is in much the same position. Splint is plentiful, with prices also unchanged. Main is in quiet demand. Want of foreign trade is the chief reason of the dulness. It is explained that many steamers now coal at ports abroad with foreign coal, which has restricted the demand from this country. The prices quoted are: Main, 5s. 10d. per ton f.o.b. Glasgow; ell, 6s. 9d.; splint, 6s. 3d. to 6s. 6d.; steam, 7s. 6d. The shipments for the week amounted to 128,121 tons—an increase upon the preceding week of 3118 tons, and upon the corresponding week of last year of 25,971 tons. For the year to date, the total shipments have amounted to 530,487 tons—an increase over last year of 69,306 tons.

The Proposed Purchase of the Deal Water-Works by the Local Authorities.—The Directors of the Deal Water Company have notified their willingness to dispose of their undertaking to the Joint Town Councils of Deal and Walmer for about £50,000.

Coventry Corporation and the Supply of Gas to Foleshill.—The Foleshill Parish Council are dissatisfied with the price charged for gas in their district by the Coventry Corporation. It is stated that the consumption amounts to, in round figures, 15 million cubic feet, and that the consumers pay £375 more than would be charged in Coventry for the same quantity. A deputation recently had an interview with the Corporation Gas Committee with the object of obtaining, if possible, a reduction; but the Committee could not see their way to the recommending of a concession. The Parish Council are now going to investigate the nature of the powers possessed by the Corporation in respect to the supply of gas in Foleshill.

The Manchester Corporation and their Coke Sales.—One of the Citizens' Auditors at Manchester (Mr. S. Norbury Williams) has startled the members of the Corporation Gas Committee by charging them with illegally selling coke to firms of which two of that body were partners, and by expressing his intention to take legal proceedings against one of them to recover four penalties of £50 each against him for acting as an Alderman while holding a contract with the Corporation. The matter came up at the meeting of the City Council last Wednesday, when Mr. Alderman Gibson, the Chairman of the Committee, replied at length to Mr. Williams's statements, and gave a history of the transaction. He said the coke in question was of inferior quality; but, owing to certain improvements made by the Aldermen referred to in their furnaces, they were able to use it, and thus take off the hands of the Committee what would otherwise have caused them trouble and annoyance. For years, he said, these two gentlemen had put hundreds of pounds a year into the city purse; and during the strike of gas-workers the price was raised to them equally with other people. From the first, the Gas Committee had acted in an upright, honourable, and businesslike way. Mr. Williams's proceedings in this matter were strongly condemned by Mr. Southern.

The New Water-Works at Broughton.—A special meeting of the Faversham District Council was held last Wednesday, to consider the tenders for carrying out the Broughton Water-Works. The Engineer (Mr. E. K. Burstal, M.Inst.C.E.) was in attendance; and the result was that the tender of Mr. K. Roberts, of West Bromwich, for £2277—the lowest sum submitted—was accepted.

The Water Supply of Kingsteignton.—Considerable opposition has been excited by the proposal of the Newton Abbot District Council to procure a supply of water for Kingsteignton from Holywell, on the estate of Lord Clifford, to which reference was made in the "JOURNAL" for the 28th ult. (p. 189). For a dozen years, the need of an improved water supply for the village has been urged by the Medical Officer of Health; but the inhabitants have rejected all the propositions made from time to time with a view to remedying what has been pronounced a grave sanitary danger. They met last Friday week to consider the Holywell scheme, which will necessitate four miles of piping, and is estimated to cost about £2000. Several speakers condemned this scheme as needlessly costly, and contended that an abundant supply could be obtained from Fairwater, within the parish, at a less cost. On the other hand, it was pointed out that to supply the district from Fairwater would necessitate pumping, and would also involve claims for compensation by two millers, who derive water power from the Fairwater stream. It was decided, with one dissentient, to proceed with the Holywell scheme; and the Surveyor (Mr. Seagar) was instructed to prepare the necessary plans.

Parish Councils and the Lighting and Watching Act.—In a recent letter to the "Standard," Mr. J. Wallis Davies points out that, in view of the power now possessed by Parish Councils to adopt the Lighting and Watching Act (3 and 4 Will. IV., cap. 90), it is of the utmost importance that there should be no doubt as to the proper majority of votes of the ratepayers necessary for its adoption. He is afraid that the opinion expressed by the Local Government Board, in a recent letter to the Returning Officer of Burnham-on-Crouch (see *ante*, p. 92), is misleading. An extract from the letter is as follows: "It seems to the Board that the provisions in section 12 of the Lighting and Watching Act, 1833, which required that, in the case of the adoption of the Act, the whole number of persons voting shall be a clear majority of the ratepayers of the parish, now makes it necessary that there should be *a clear majority of the parochial electors who vote on the question at the parish meeting*, or at a poll consequent thereon." Mr. Davies calls special attention to the words in italics, to show that section 12 refers to a poll only, and not to a parish meeting. Section 8 of the Act, 1833, which deals with its adoption at a parish meeting only, requires that a majority consisting of two-thirds of the votes of the ratepayers present at such meeting should be necessary, and not a clear majority of the parochial electors who vote on the question. He says that the Board seem to have overlooked the fact that a different majority is required at a parish meeting under section 8 of the Act than on a poll under section 12.

The Opposition to the Newcastle and Gateshead Gas Company's Bill.—The Parliamentary and Bye-Laws Committee of the Newcastle Corporation have agreed to enter a strong protest against the above-named Bill on several grounds; one of them being the proposal of the Company to obtain compulsory powers to purchase 75 acres of land on the Walker Estate for the erection of gas-works, and also for 340 yards of river frontage. It is contended that the erection of such works would materially depreciate the value of surrounding property. It has also been decided to take steps to obtain an increase of 2½ candles in the illuminating power of the street-lamps.

Sales of Shares.—Last Wednesday, Messrs. Lancaster and Sons, of Barnsley, obtained £206 for £100 of original stock in the Barnsley Gas Company; £17 12s. 6d. each for 23 "C" £10 shares in the same concern; and £3 3s. each for £2 10s. shares in the Worsbro' Gas Company.——At a sale a few days ago at West Hartlepool, £5 shares in the local Gas and Water Company realized £9 2s. each.——At the Mart, Tokenhouse Yard, last Thursday, Messrs. J. & A. W. Tharp sold stocks and shares in various undertakings; among them being the following: £350 of old stock in the Commercial Gas Company realized £1151 10s.; 155 £5 shares in the West Ham Gas Company, £1816 5s.; 20 £10 shares in the same Company, £312 10s.; 50 £5 "B" shares in the Romford Gas Company, £428 15s.; and annuities in the London Bridge Water-Works (payable by the New River Company), £232 10s. ——At Haslingden, last Thursday, Mr. R. Greenwood offered for sale two "A" (10 per cent) and five "B" (7½ per cent.) shares in the Haslingden Union Gas Company. They were £10 shares. The "A" shares sold for £20 6s. 6d. each; the "B" shares, for £18 13s.

Destructive Gas Explosion at Doncaster Parish Church.—On Friday evening last, an explosion of gas occurred at the Doncaster Parish Church, resulting in considerable damage to the fine edifice. A new gas-meter has been placed in the north transept, in order to furnish a separate supply of gas in the transept, chancel, and Forman Chapel; and workmen were engaged until nearly five o'clock in making the connection. The old meter is at the west end of the church, and was connected with the new one; and it is supposed that the latter had been left uncapped, as the men had not completed the connection with the main-pipe when they left work. Shortly before five o'clock the chief verger (Mr. Marsden) went into the church to prepare for service. When the choir entered, they complained to him of a smell of gas; and he proceeded from the chancel in the direction of the west end, with a lighted taper in his hand, in order to turn off the gas at the meter. When he reached the north transept, he was (so he puts it) suddenly surrounded by fire. He turned off the gas, and was returning when the explosion occurred, working great destruction. A new choir vestry, erected last year in the transept, was entirely demolished; and a beautiful stained-glass window, which is said to have cost nearly £1000, is a complete wreck. In all about ten stained-glass windows have been damaged by the explosion; and the total loss is probably not less than £2000.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 272).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	23½–24½	+½	4 5 8
100,000	10	„	7½	Do. 7 p. c.	16½–17½	..	4 5 8
300,000	100	2 Jan.	5	Australian (Sydney) 5% Deb.	107–109	..	4 11 9
200,000	10	16 Oct.	4	Belgrano (B. Ayres), Limited	7–8	..	5 0 0
100,000	Stck.	30 Dec.	5	Do. 5 p. c. Deb. Stk	92–97	..	5 3 1
200,000	5	14 Nov.	6½	Bombay, Limited	7–7½	..	4 6 8
40,000	5	„	6½	Do. New, £4 paid	5–5½	..	4 14 7
380 000	Stck.	14 Aug.	12	Brentford Consolidated	275–280	+2	4 5 8
210,000	„	„	9	Do. New	215–220	+3	4 1 9
50,000	„	„	5	Do. 5 p. c. Pref.	—	..	—
159 375	„	16 Dec.	4	Do. 4 p. c. Deb. Stock.	127–132	..	3 0 7
220 000	Stck.	27 Sept.	11	Brighton & Hove Original	230–235	..	4 13 8
208,820	„	„	8	Do. A Ord. Stk.	185–190	..	4 4 3
933,500	Stck.	29 Aug.	5	Bristol, 5 p.c. max.	124–128	..	3 18 1
420,000	20	27 Sept.	11¼	British	54½–55½	..	4 1 1
50,000	10	29 Aug.	11½	Bromley, Ordinary 10 p. c.	22½–23½	..	4 17 10
67 010	10	„	8½	Do. 7 p. c.	19–20	..	4 5 0
500,000	10	14 Nov.	4	Buenos Ayres (New) Limited	8¼–8¾	+¼	4 11 5
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	101–103	..	5 16 7
150,000	20	11 July	8½	Cagliari, Limited	30–32	..	5 3 3
100,000	10	27 Sept.	6	Cape Town & District, Ltd.	12¾–13½	..	4 8 10
50,000	50	2 Nov.	6	Do. 6 p. c. 1st Mort.	56–58	..	5 3 6
550,000	Stck.	16 Oct.	13½	Commercial Old Stock	325–330	..	4 1 10
165,000	„	„	10½	Do. New do.	256–261	..	4 0 6
165,000	„	16 Dec.	4½	Do. 4½ p. c. Deb. do.	147–152	..	2 19 2
800,000	Stck.	16 Dec.	13	Continental Union, Limited.	267–272	+2	4 15 7
200,000	„	„	10	Do. 7 p. c. Pref.	210–215	..	4 13 0
51,600	Stck.	29 Aug.	14	Croydon Com'cial A 10 p. c.	280–285	..	4 18 3
157,500	„	„	11	Do. B 7 p. c.	222–227	..	4 16 11
535 000	Stck.	29 Aug.	5½	Crystal Palace Ord. 5 p.c. Stk	127–132	..	3 19 6
60,000	„	„	5	Do. 5 p. c. Pref.	—	..	—
486,090	10	30 Jan.	11	European, Limited	26–27*	+½	4 1 6
354,060	10	„	11	Do. £7 10s. paid	17–18*	..	4 14 3
5,746,590	Stck.	14 Aug.	12¾	Gaslight & Coke, A, Ordinary	303–308	+3	4 2 9
100,000	„	„	4	Do. B, 4 p. c. max.	107–112	..	3 11 5
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	292–297	..	3 7 4
30 000	„	„	5	Do. F, 5 p. c. Prf.	135–140	..	3 11 5
60,000	„	„	7½	Do. G, 7½ p. c. do.	200–205	..	3 13 2
1,300,000	„	„	7	Do. H, 7 p. c. max.	198–202	..	3 9 3
463,000	„	„	10	Do. J, 10 p. c. Prf.	287–292	..	3 8 6
476,000	„	„	6	Do. K, 6 p. c. Prf.	170–174	..	3 9 0
1,061,150	„	16 Dec.	4	Do. 4 p. c. Deb. Stk.	137–140	..	2 17 2
234,850	„	„	4½	Do. 4½ p. c. do.	148–153	..	2 18 9
908,000	„	„	6	Do. 6 p. c. do.	204–209	+4	2 17 5
70,000	10	30 Oct.	6	Hongkong & China, Limited	13–14	..	4 5 8
3,800,000	Stck.	14 Nov.	12	Imperial Continental	247–252	..	4 15 3
376,400	100	1 Feb.	4	Do. 4 p. c. Debs. Red.	100–103*	..	3 17 8
473,600	Stck.	14 Aug.	3½	Do. 3½ p. c. Deb. Stk	108–110	..	3 3 8

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	16 Dec.	6	Malta & Mediterranean, Ltd.	6–6½	..	4 12 4
560 000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	114–117	+1	4 5 6
250,000	100	„	4½	Do. 4½ p. c. Debs.	103–110	+1	4 1 10
541,920	20	14 Nov.	5	Monte Video, Limited	16–17	..	5 17 8
150,000	5	28 Nov.	8	Oriental, Limited	8–8½	..	4 14 1
135,000	5	„	8	Do. New, £4 10s. paid	6½–6¾	..	5 6 8
15,000	5	„	8	Do. do. 1879, £1 paid	1¼–1½	..	4 11 5
60,000	5	12 Sept.	7	Ottoman, Limited	5–5½	..	6 7 3
166,870	10	14 Feb.	2	Para, Limited	1¼–1¾	..	11 8 6
420,000	100	2 Nov.	6	People's Gas } 1st Mtg. Bds.	105–110	..	5 9 1
500,000	100	9 Dec.	6	of Chicago } 2nd Do.	100–105	..	5 14 3
250,000	10	16 Oct.	7	San Paulo, Limited	11–12	..	5 16 8
500,000	Stck.	29 Aug.	15½	South Metropolitan, A Stock	382–387	+4	4 0 1
1,350,000	„	„	12	Do. B do.	310–315	..	3 16 2
310,000	„	„	13	Do. C do.	327–332	+2	3 18 4
800,000	„	16 Jan.	5	Do. 5 p. c. Deb. Stk.	173–176	..	2 16 10
60,000	Stck.	12 Sept.	11½	Tottenham & Edmonton, A	250–255	..	4 10 2
60,000	„	„	8½	Do. B	—	..	—
170,380	10	30 Dec.	10	Tuscan, Limited	13–14	..	7 2 10
149,900	10	2 Jan.	5	Do. 5 p. c. Debs. Red.	100–102	..	4 18 0

WATER COMPANIES.

746,021	Stck.	30 Dec.	10½	Chelsea, Ordinary	300–305	+8	3 7 2
150,000	„	„	5	Do. 5 p. c. Pref.	168–173	..	2 17 9
160,000	„	„	4½	Do. 4½ p. c. Pref. Stk., 1875	—	..	—
175,783	„	27 Sept.	4½	Do. 4½ p. c. Deb. Stock	155–160	..	2 16 3
1,719,514	Stck.	16 Oct.	7	East London, Ordinary	231–236	+11	2 19 4
654,740	„	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3
100,003	„	„	3	Do. 3 p. c. Deb. Stk.	105–107	..	2 16 1
700,000	50	16 Dec.	6½	Grand Junction, 10 p.c. max.	118–122	..	2 13 3
280,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	145–150	..	2 13 4
708,000	Stck.	29 Aug.	12	Kent	315–320	+5	3 15 0
160,003	„	„	7	Do. New, 7 p. c. max.	203–208	+3	3 7 3
1,043,800	100	30 Dec.	7½	Lambeth, 10 p. c. max.	252–257	+7	2 16 5
406,200	100	„	7½	Do. 7½ p. c. max.	208–213	..	3 8 1
330,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	145–150	..	2 13 4
500,000	100	14 Aug.	12½	New River, New Shares	395–400	+8	3 2 0
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	141–146*	..	2 14 10
902,300	Stck.	16 Dec.	6	S'thwk & V'xhall, Ordinary	153–158	+1	3 16 0
126,500	100	„	6	Do. Do. 7½ p. c. Max.	140–145	+2	4 2 9
489,200	Stck.	„	5	Do. Do. 5 p. c. Pref.	168–173	..	2 17 9
1,019,585	„	—	4	Do. 4 p. c. A Deb. Stk.	145–150	..	2 13 4
1,155,066	Stck.	16 Dec.	10	West Middlesex	300–305	+8	3 5 6
200,000	„	„	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3

*Ex div.

The Proposed Purchase of Ashford Gas-Works.—The Directors of the Ashford Gas Company have resolved not to enter into negotiations for the sale of their undertaking to the Ashford District Council.

Water Supply for Amble, Northumberland.—The Amble District Council have now commenced the work of bringing spring water to the town from distant sources. All the preliminary surveys, investigations, and plans have been made; and the contract has been let to a local firm for £5898. Mr. M. Temple Wilson, of Alnwick, the Engineer, estimated the total cost as likely to be £6600. By the scheme, the water will be conveyed by gravitation from a drift near Newton Colliery, and a number of springs at Hazow, into a collecting and subsidence reservoir, which will hold 100,000 gallons. There will be laid upwards of 11 miles of 6-inch, 4-inch, 3-inch, and 1½-inch cast-iron pipes; and there will be a service reservoir to hold a million gallons, or more than a fortnight's supply at the rate of 20 gallons per day per head of the population of 4000.

Proposed Purchase of the East Grinstead Gas and Water Works by the District Council.—At the meeting of the East Grinstead District Council last Thursday, Mr. Steer moved—"That overtures be made to the East Grinstead Gas and Water Company with a view to the purchase of their undertaking by mutual arrangement." He said he did not know if it would be possible to separate the two branches of the undertaking; but, if this could be done, he would prefer that the Council should first of all acquire the water-works. This, however, could be dealt with by a Committee. The motion having been seconded, Mr. Chignell said he would support it so far as it referred to the supply of water, which would always be required; but gas was a commodity which he thought was being gradually superseded. He should therefore move, as an amendment, that the negotiations should only refer to the water supply. Mr. Yorke seconded the amendment. It was eventually agreed that the words "particularly that of the water supply," should be added to the resolution, which was then put and carried. A Committee was appointed to deal with the matter.

The Water Supply of the Ilford District.—Reference was made in the "JOURNAL" for the 14th ult. to the agitation going on at Ilford in regard to the water supply of the district. The question was mainly one of charges and boundaries; and a Committee was formed to confer with the South Essex Water Company on behalf of the ratepayers. The conference has taken place; and we learn that the Directors have agreed that where, in their opinion (in respect of the houses in dispute in Ilford only), the rateable value fairly represents the annual value, they will collect the water-rate on that basis; but where they consider that the rateable value, as in the valuation list, does not fairly represent the annual value, they will, before seeking to alter the rate, communicate with Mr. Benton, the Clerk to the Ilford Urban District Council, or the Overseers, with a view to having the figures adjusted by agreement. With regard to the hardness of the water, a fresh source of supply has been opened at Romford; and this water is somewhat softer than that obtained at Greys. Regarding the charges for water, the Directors feel that the growth of urban districts within their area should be encouraged; but they do not think it would be possible to alter the rates now charged, though they may, in course of time, see their way consistently with their duty to the shareholders, to allow a discount in respect of water-rates paid promptly.

The Steyning East Rural District Council and the Brighton Corporation Bill.—The contemplated opposition by the Steyning East Rural District Council to the Bill promoted by the Brighton Corporation to enable them to purchase the undertaking of the Shoreham Water Company has called forth a letter to them from the Local Government Board. The Board say they are advised that Rural District Councils are not governing bodies within the meaning of the Municipal Corporations (Borough Funds) Act, 1872; and that therefore the power to undertake the promotion or opposition of Bills given by that Act does not apply in the case of any such authority as the Steyning East Rural District Council. As regards the general question of the power of Rural District Councils to oppose Bills in Parliament, the Board observe that many cases have been before the Courts in which public trustees have sought to apply funds raised by local rates towards defraying the expenses of promoting or opposing Bills in Parliament affecting the matters entrusted to them; and the principle seems to be established by these cases that, where a Bill is promoted by other parties, and is likely to affect injuriously the property, rights, or powers entrusted to such public trustees, the latter are justified—if they act *bonâ fide* and with reasonable prudence—in expending their trust funds in opposing the measure. It was consequently for the Steyning East Council to carefully consider their position, and how far their contemplated opposition to the Brighton Bill came within the principle indicated.

Colne Valley Water Company.—At the half-yearly meeting of this Company to be held in London to-day, the Directors will report a profit of £4686 on the revenue account, which sum is increased to £4857 by the addition of £171 carried forward; and the higher total stands to the credit of the dividend and interest account. The amount available for dividend on the ordinary shares is £3061; and out of this it is proposed to pay at the rate of 4 per cent. per annum, less income-tax—leaving £125 to be carried forward. During the six months ending Dec. 31, a sum of £1385 was expended on capital account, chiefly for extensions of mains. No additional capital was raised; but it is intended shortly to issue some new £10 shares.

Proposed Purchase of the Exmouth Water Undertaking.—The Exmouth District Council have under consideration the question of purchasing the undertaking of the Exmouth and District Water Company. At a meeting of the Council on Wednesday last, it was decided to ask the Company if they are prepared to treat for the sale, and upon what terms. In his annual report presented at the same meeting, the Medical Officer of Health alluded to the water supply as still of excellent quality, and of quantity sufficient for the requirements of a larger town; but he added the expression of his own opinion that all towns should have control of the water-works.

The Management of the Longton Gas-Works.—At the meeting of the Longton Town Council last Thursday, the Gas Committee presented their annual report, which showed a net profit of £1775, of which £100 had been written off for depreciation of meters. Mr. Johnson proposed the adoption of the report, and explained that the difference in the profit of £3920 in 1883 and that of £1675 in 1894 was due to the reduction of the price of gas, the abolition of meter-rents, the discount of 5 per cent., the increase of rates and income-tax, and additions to the reserve fund. If these matters had been the same as in 1883, the profit would have been £6340. Mr. Dawson made a number of serious allegations against the management of the gas-works, contending that the plant was in a wretched state, while, owing to this, the men had to work under cruel conditions. He moved that an expert be engaged to examine and report upon the plant and management of the works. Alderman Leak thought, after the sweeping assertions made by Mr. Dawson, the Chairman and Manager would be most anxious to accept the amendment, and have an expert to report. A long discussion followed, and Mr. Johnson intimated that he was quite willing there should be an inquiry into the correctness of Mr. Dawson's charges.

Compensation for Injuries from Insufficient Sewerage at Slough.—In the Queen's Bench Division last Wednesday, the Lord Chief Justice and a special jury had before them an action brought by M. Touzeau, a French master at Eton College, against the Slough District Council, to recover damages for injuries alleged to have been caused to him and his family by a nuisance arising from an insufficient sewer under the control of the defendants. Plaintiff was tenant of Spring Cottage, Upton Park; and it was stated on his behalf that, owing to serious illness in his family, brought on, as he said, by contaminated air and water from the defective sewer, which passed close to his house, he had to remove into Slough, at great inconvenience. Evidence was given by the family doctor to the effect that the illness of the plaintiff's children and servants was due to the overflow of sewage. For the defendants, it was contended that there was not sufficient evidence that the illness was caused in the way stated. In 1880, the Urban Sanitary Authority constructed a sewer which was at the time adequate; and when, in 1893, they found that the old sewer was insufficient, they at once took steps to borrow the money necessary for making a new one. There were the inevitable delays; but the new sewer was now finished. It was suggested that the plaintiff had never examined his own drains, which were probably the real cause of the pollution of the well. Mr. J. Baker, the Surveyor of the District Council, gave evidence as to the position of the sewer. He said it was constructed in 1880, and was sufficient as long as there was no rain. In reply to his Lordship, he stated that if he had made it, it would have been larger. He came to the conclusion that the old sewer was insufficient soon after his appointment in 1882, and told the Drainage Committee. Defendant's Counsel (Mr. Bucknill, Q.C.) said that, after this evidence, which had come as a surprise to him, he could no longer contend that the sewer was originally sufficient. Dr. Corfield, the Medical Officer of Health for St. George's, Hanover Square, said that typhoid, from which plaintiff's son suffered, was far more likely to result from drinking impure water than from bad smells. The sanitary arrangements at Spring Cottage were of an obsolete kind, and would not now be allowed in any London house. His Lordship, in addressing the jury, remarked upon the frankness with which Mr. Baker had given evidence. After an absence of ten minutes, the jury returned a verdict for the plaintiff—damages £250.

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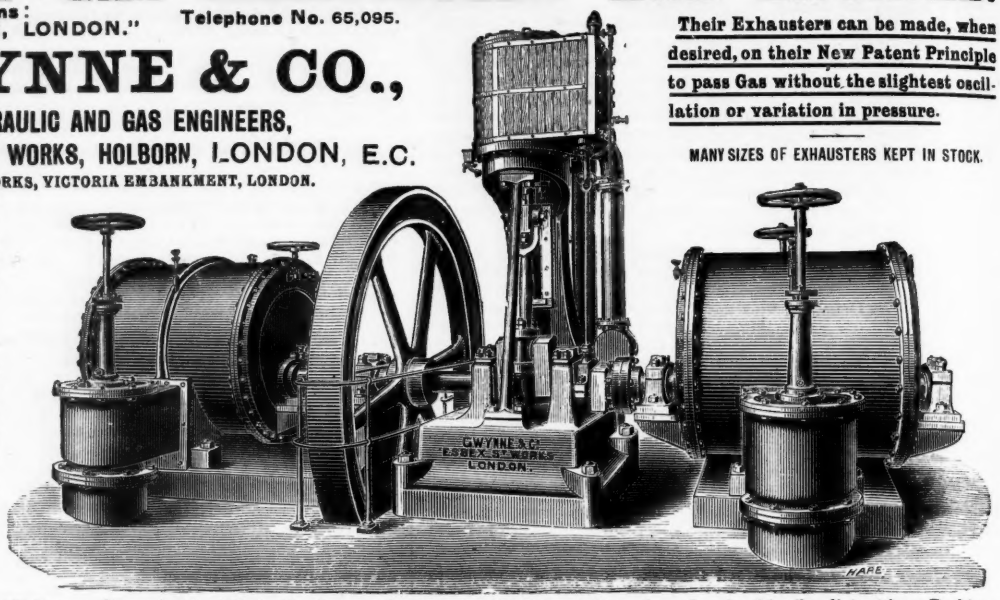
Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

AMMONIACAL LIQUOR Wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

GOLD MEDAL, 1892.

TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 256, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

BACK-PRESSURE IN PURIFIERS.

THE Valve invented by Mr. Cripps for Bye-Passing any Layer of Purifying Material (referred to by the President of the Incorporated Institution of Gas Engineers in his Inaugural Address) can be obtained of the Makers: C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP, and J. EVERY & SON, Phœnix Iron-Works, LEWES, to which Firms all inquiries should be addressed.

WANTED, Two good Gas-Fitters for Prepayment Meter Work.
Apply to the NUNEATON GAS COMPANY.

WANTED, a re-engagement as Working MANAGER or MANAGER of Small Works. Thoroughly experienced in Carbonizing, Engines and Exhauster, Main and Service Laying, Fitting up Houses on the Automatic System, and all the General Routine of a Gas-Works. Good Testimonials.
Address W. OWEN, Manager, Horley District Gas Company, Horley, SURREY.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow, and Newcastle-on-Tyne. Telegrams: "Subastral, London."

TO Engineers and Managers, wishing to adopt the GENERATIVE or REGENERATIVE PRINCIPLES — Advertiser, having had 18 years' experience in Gaseous Firing, including the latest Improvements, is open to take any Work of the kind or the construction of Water-Gas Plants.
Address No. 2631, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SCARBOROUGH GAS COMPANY.

ASSISTANT MANAGER.

THE Directors of the Scarborough Gas Company are prepared to receive APPLICATIONS for the position of ASSISTANT MANAGER.
Salary, £150 per annum.
Applications, accompanied by *copies* of Three recent Testimonials, to be delivered to the undersigned not later than noon on Tuesday, Feb. 18, endorsed "Assistant Manager."
Schedule of Duties on Application.
Canvassing will be a disqualification.
J. HOLLIDAY, A.M.Inst.C.E., F.C.S.,
Engineer and Secretary.
Gas Offices: 32, Westborough, Scarborough.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method.
J. HARDMAN, Manufacturing Chemist.
Milton, Staffs.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

MANAGER and Foreign Correspondent wanted with a thorough knowledge of the Gas-Meter Trade throughout Europe. Must be a good Linguist, and have exceptional References.
Apply, by letter, stating Age and Salary required (which will be treated in confidence), to No. 2633, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

KING'S TREATISE ON COAL GAS.

WANTED, by the Advertiser, Vol. I. of this Work, or the Three Volumes complete.
Send lowest Cash Price to No. 2632, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Offers for 90 and 50 per cent. BENZOLS and NAPHTHAS. Particulars and Samples on Application.
Apply, by letter, to No. 2630, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MARKET HARBOROUGH GASLIGHT AND COKE COMPANY.

THE Directors of the above Company invite TENDERS, with Plans and Specifications, for an 80 feet diameter by 20 feet deep GASHOLDER, two Lifts, with Brick and Puddle Tank, to be erected at their Works.
Sealed tenders to be sent to the Chairman on or before the 5th of March next.
The Directors do not bind themselves to accept the lowest or any tender.
All Particulars may be had on application to the undersigned.
J. FRYER,
Manager.
Feb. 5, 1896.

FOR SALE—Four Purifiers, 6 feet Square by 3 feet deep, with Dry-Faced Centre-Valve and Connections, Lifting Apparatus, and Wrought-Iron Girders for same to travel on, complete. Also a 5-inch Dry-Faced FOUR-WAY VALVE.

Apply to GEORGE MOAT, Manager, Gas-Works, Purston, near PONTEFRACT.

GAS PLANT, BUILDINGS,

AND

FREEHOLD LAND AT CARSHALTON, SURREY, FOR IMMEDIATE SALE.

THE Croydon Commercial Gas and Coke Company, having discontinued the Manufacture of Gas at their Works in Wrythe Lane, Carshalton, Surrey, have the following GAS PLANT, APPARATUS, BUILDINGS, and FREEHOLD LAND FOR SALE, viz.—

Retort-House and Coal-Store complete, with Wrought-Iron Roofs, six Beds of six Round Fire-Clay Retorts in each, 18 inches diameter by 9 ft. 3 in. long, and three Beds of similar new Retorts and Arches, and three Arches, complete, ready for Retorts.
Hydraulic Mains, Fittings, &c.
Battery Condenser, with 12-inch Valves, Connections, and Bye-Passes.
Horizontal Steam-Engine, Exhauster, and Exhauster Governor, complete.
Washer (Good's Patent), 8 feet diameter, with 12-inch Connections and Valves complete.
Washer, 12-inch, with 6-inch Connections and Valves complete.
Four Purifiers, 12 feet square, with Sieves and 12-inch Connections, Lifting Apparatus and Railway for same, complete.
Station Meter, 10,000 cubic feet per hour, with 12-inch Connections.
Gasholder (Single-Lift), 80 feet by 24 feet, with Brick Tank, Columns, Inlet and Outlet Valves complete, prepared for Telescoping.
Gasholder (Single-Lift), 60 feet by 16 feet, Standards, Brick Tank, &c.
Gasholder, 35 feet by 12 feet, Standards, Brick Tank, &c.
Governor, 6 inches diameter, with 6-inch Valves and Bye-Pass complete.
Governor, 12 inches diameter, with 12-inch Valves and Bye-Pass complete.
Evans Photometer, Clock, Gauges, &c., complete.
Three Large Cast-Iron Water-Tanks (above ground).
Liquor-Tank.
House and Offices, Engine and Boiler House, Meter-House, Lobby and Store-Room, Governor-House and Testing-Room, Purifying House and Shed, Smith's Shop.
Freehold Land, 3 acres, 0 roods, 37 perches (about 2 acres not built upon).

Orders to view the Plant and Works, and Particulars of Prices the Company require for the whole or any portion of the above, can be obtained on application to

W. J. RUSSELL,
Secretary.

Offices: Katharine Street, Croydon,
Jan. 18, 1896.

RECOVERED SULPHUR FOR SALE.

THE South Metropolitan Gas Company invite TENDERS for the purchase of about 60 Tons of RECOVERED SULPHUR, to be delivered in bulk into Buyer's Barge in the Surrey Canal.

Samples and further Information may be obtained on application at the Chief Engineer's Office, 709A, Old Kent Road, S.E.

FRANK BUSH,
Secretary.

February, 1896.

SOUTH SHIELDS GAS COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors invite Tenders for the purchase of the surplus TAR produced during the current Year.

Estimated quantity, about 400,000 gallons, delivered into Buyer's Tanks on Rail at South Shields and Jarrow.

The Directors do not bind themselves to accept the highest or any tender.

Tenders, stating price per gallon, to be delivered to the undersigned not later than Thursday, the 13th inst., endorsed "Tender for Tar."

By order,
J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, Feb. 4, 1896.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee are pre- pared to receive TENDERS for supplying and fixing One TELESCOPIC GASHOLDER, 100 feet diameter, required at their Hollinwood Gas-Works.

Specification may be obtained and Plans seen on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham.

Tenders to be sent in on or before the 4th of March, 1896.

A. NICHOLSON,
Town Clerk.

BOROUGH OF BARROW-IN-FURNESS.

(GAS AND WATER DEPARTMENT.)

TENDERS FOR GENERAL STORES.

THE Corporation are prepared to receive TENDERS for the supply of FIRE-CLAY RETORTS and BRICKS, WROUGHT-IRON TUBES and FITTINGS, BRASS COCKS, GAS-METERS, OIL and PAINT, SULPHURIC ACID, LIME, IRONMONGERY, &c., as may be required from the 1st day of April next to the 31st of March, 1897.

Sealed tenders on forms to be obtained at the Office of the Manager of the Gas and Water Works, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tenders for Stores," to be delivered at the Town Clerk's Office on or before Tuesday, the 18th inst.

The lowest or any tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
Feb. 6, 1896.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works from the 1st day of April next to the 31st day of March, 1897, delivered into Purchaser's Tank-Waggons at the Gas-Works Siding.

Any further Information may be had on application to the Manager of the Gas-Works.

Sealed tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Tar," to be delivered at the Town Clerk's Office, on or before Tuesday, the 18th inst.

The highest or any tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
Feb. 6, 1896.

LEEDS CORPORATION.

TENDERS FOR FIRE GOODS.

THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICKS, LUMPS, and FIRE-CLAY.

Particulars as to Quantity, together with Forms of Tender, may be obtained from the undersigned.

Tenders, endorsed "Fire Goods," and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Wednesday, the 19th inst.

The Committee do not bind themselves to accept the lowest or any tender.

R. H. TOWNSLEY,
General Superintendent.

Municipal Buildings, Leeds,
Feb. 1, 1896.

LEEDS CORPORATION.

TENDERS FOR UNDERGROUND TAR-WELL.

THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the excavation and erection of an UNDERGROUND TAR-WELL at the New Wortley Gas-Works.

Plan can be seen, and Specification and Bills of Quantities obtained, on application to Mr. R. Smith, the Manager of the above Works.

Tenders, endorsed "Tar-Well," and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Monday, the 17th inst.

The Committee do not bind themselves to accept the lowest or any tender.

R. H. TOWNSLEY,
General Superintendent.

Feb. 1, 1896.

THE Directors of the Sunbury Gas Con- sumers' Company, Limited, invite TENDERS for their surplus TAR and LIQUOR.

The Contractor to state price per gallon for Tar, and price per 1000 gallons of Liquor of 10-oz. Twaddel test.

The Gas Company to load same into Contractor's Barge on the River Thames at Sunbury, in the County of Middlesex.

Sealed tenders, endorsed "Tender for Tar," to be sent to me not later than the 22nd inst.

F. D. SANDELL,
Secretary.

SELBY URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Selby Urban District Council are prepared to receive, on or before noon on Monday, the 24th day of February, 1896, OFFERS for about 3000 Tons of high-class COAL suitable for Gas Making, for delivery in suitable Waggons at the Gas-Works Siding, Selby, in such quantities as may be required for a period of One Year, commencing about the 1st day of June next.

Particulars and Printed Forms of Tender may be had on application (*in writing only*) from the undersigned, to whom tenders, duly endorsed "Tender for Coal," must also be addressed.

By order of the Council,
MATT. DUNN, A.M.Inst.M.E.,
Engineer and Manager.

Gas-Works, Selby,
Feb 5. 1896.

BOROUGH OF NELSON.

(GAS DEPARTMENT.)

INSTALLATION OF INCLINED RETORTS.

TO ENGINEERS, IRONFOUNDERS, ETC

THE Gas Committee of the above Cor- poration invite TENDERS for the supply and erection of Twelve Beds of INCLINED RETORTS.

Drawings may be seen by appointment, and Specifications and Form of Tender obtained, on and after Thursday, Feb. 13, 1896, on application to the Engineer, Mr. W. Foster, on payment of £5 5s., which will be returned on receipt of a *bonâ-fide* tender.

Sealed tenders, endorsed "Tender for Gas Plant," to be delivered by post to the undersigned, on or before Twelve o'clock noon on Friday, the 21st day of February, 1896.

The Gas Committee do not bind themselves to accept the lowest or any tender.

R. M. PRESCOTT,
Town Clerk.

Town Hall, Nelson,
Feb. 4, 1896.

BOROUGH OF RICHMOND, SURREY.

WATER-WORKS AND PUBLIC BATHS.

TENDERS FOR WELSH SMOKELESS STEAM COAL.

THE Town Council for the Borough of Richmond, Surrey, invite TENDERS for the supply of about 1400 Tons of Best WELSH SMOKELESS STEAM COAL, to be delivered in Barges of about 40 Tons alongside the Wharf opposite the Water-Works Richmond, for One Year, from March 31, 1896.

The Seam and District from which the Coal is to be supplied must be stated on the Tender.

Particulars and Forms of Tender can be obtained of Mr. W. G. Peirce, Engineer at the Water-Works.

No tender will be recognized unless it is made on the prescribed form, properly filled up in every respect, and no expenses or claim will be allowed or paid to any person whether tendering or not.

The Security stipulated by the Public Health Act, 1875, for the due performance of the Contract, will be required. The Contract and Bond will be prepared by the Town Clerk.

Sealed tenders, endorsed "Tender for Welsh Coals," and addressed to the Chairman of the Water Supply Committee, Borough of Richmond, Surrey, must be delivered at the Town Clerk's Office by Ten o'clock on Tuesday, the 3rd day of March, 1896.

The Council do not bind themselves to accept the lowest or any tender.

FREDK. B. SENIOR,
Town Clerk.

Town Clerk's Office, Town Hall,
Richmond, Surrey, Feb. 4, 1896.

Now Ready, Handsome Cloth, 9s. Post free,

GAS MANUFACTURE

(THE CHEMISTRY OF);

HANDBOOK ON THE PRODUCTION, PURIFICATION, AND TESTING OF ILLUMINATING GAS, AND THE ASSAY OF THE BYE-PRODUCTS OF GAS MANUFACTURE.

For the Use of Students.

BY W. J. ATKINSON BUTTERFIELD, M.A., F.C.S.,

Head Chemist, Gas-Works, Beckton, London, E.

WITH NUMEROUS ILLUSTRATIONS.

*** This work deals with the MOST MODERN DEVELOPMENTS of the subject; and the chapter treating of the BYE-PRODUCTS will be found of special interest.

London: CHARLES GRIFFIN & Co., Ltd., Exeter Street, Strand.

ARROL-FOULIS

Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

[See Illustrated Advertisement, Feb. 4, p. 211.]

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Ossett Gas Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR and surplus TAR produced at their Works during the Twelve Months ending April 30, 1897.

Liquor to be quoted for both by Twaddel's and Wills's Tests.

Tenders to be sent in not later than Wednesday, March 4, 1896.

By order,
JAS. CASTLE,
Secretary.

Ossett, Feb. 7, 1896.

MANCHESTER CORPORATION GAS-WORKS.

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Manchester Corporation are prepared to receive TENDERS for the purchase and removal of the TAR and AMMONIACAL LIQUOR to be produced at their Droylsden Station during a period of One or more Years from the 31st of March, 1896.

The Committee do not bind themselves to accept the highest or any tender.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed, "Tender for Tar and Liquor, Droylsden," must be delivered at the Offices of the Gas Department, Town Hall, on or before Thursday, the 27th day of February, 1896.

Forms of Tender and further Particulars may be obtained on application (in writing) to Mr. Charles Nickson, Superintendent of the Gas Department.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Feb. 7, 1896.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that an EXTRAORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 26th day of February, at Two o'clock in the afternoon precisely, to ELECT A DIRECTOR in the place of Mr. B. Leigh Smith, who has resigned his seat on the Board.

Any Proprietor, duly qualified, intending to become a Candidate, must give notice in writing at the Office of the Company at least Fourteen Days previously to the day of Election.

Proxies, to be available, must be transmitted to the undersigned not less than 48 hours before the time appointed for holding the Meeting.

By order,
FRANK BUSH,
Secretary.

No. 709A, Old Kent Road, S.E.,
Feb. 1, 1896.

HARROW AND STANMORE GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Monday, the 2nd day of March, 1896, at One o'clock precisely, to receive the Directors' and Auditors' Reports, to declare a Dividend, to elect a Director and an Auditor, and to transact any Ordinary Business of the Company.

The REGISTER OF TRANSFER BOOKS WILL BE CLOSED from Feb. 28 until March 13, both inclusive.

The Meeting will afterwards be made SPECIAL for the following purpose: To AUTHORIZE the Directors to issue £20,000 of ADDITIONAL CAPITAL, and to borrow on MORTGAGE, or by the creation of DEBENTURE STOCK, £5000 in respect of such Additional Capital, in pursuance of the Acts of Incorporation, in such manner and at such times as they may deem best.

By order of the Board,
J. L. CHAPMAN,
Secretary.

Gas Office: Roxeth, Harrow,
Feb. 10, 1896.

REPORTS OF GAS ASSOCIATIONS

— UNITED KINGDOM —

THIRTEENTH YEAR.

Now Ready, Price 5s. 6d. each, Post Free,

THE COMPLETE REPORTS

OF PROCEEDINGS OF THE

DISTRICT ASSOCIATIONS of GAS MANAGERS FOR 1895.

The Twelve previous Volumes (for 1883 to 1894) are still on Sale. Price 5s. 6d. each, post free.

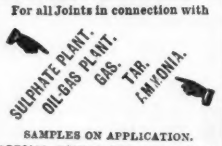
LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ESTABLISHED 1862.

TRADE MARK.

NEW GAS PLANT CEMENT

For all Joints in connection with



SAMPLES ON APPLICATION.

SPECIAL PAINTS FOR GAS-WORKS.

Telegrams "Enamel." Nat. Tel. 1759.

John E. Williams & Co., *Victoria Paint Works,* **Manchester.**

NOTICE.

Whereas it has come to the knowledge of the INCANDESCENT GAS-LIGHT COMPANY, Limited, of Palmer Street, Westminster, that a Company called the Meteor Incandescent Gas-Light Company, Limited, a firm known as Putz and Co., and a Company known as the Evening Sunlight Incandescent Light Company are selling, and are offering for sale, forms of Incandescent Gas-Lights called respectively the "Meteor," the "Champion," and the "Evening Sunlight."

THIS IS TO GIVE NOTICE, THAT THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, will commence ACTIONS FOR INFRINGEMENTS of their Patents against all persons found dealing in any manner with the said "Meteor," "Champion," or "Evening Sunlight" Incandescent Gas-Lights, which are all constructed in Infringement of the Patent of the Incandescent Gas-Light Company, Limited.

The validity of the Company's Patent has been certified by the Hon. Mr. Justice Romer.

FAITHFULL & OWEN,
11, Victoria Street, S.W.
Solicitors for the Incandescent Gas-Light Company, Limited.

NOTICE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

"The Incandescent Gas-Light Company, Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo,* Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—

The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others,* the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.

(Signed) FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WARNING.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WHEREAS, it has been brought to the notice of the INCANDESCENT GAS-LIGHT COMPANY, LIMITED, that divers Firms upon the Continent of Europe are Manufacturing Incandescent Gas-Mantles, and are sending the same into this Country, and are issuing Advertisements offering to forward the same carriage paid into this Country, or to deliver the same to the Purchasers at various places on the Continent, and are also advertising in this Country for Agents to push the sale of these Mantles.

THIS IS TO GIVE NOTICE, that all such Mantles are Infringements of the Company's Patent, and that the Company will take proceedings for Infringement against all persons purchasing or using any of such Incandescent Gas Mantles. The Company own the Master Patents in this Country for the manufacture of Incandescent Gas Mantles, and the validity of such Patents has already been certified by the Honourable Mr. Justice Romer, and the Company will enforce their Patent Rights against all Infringers.

FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.
11, Victoria Street, Westminster.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an Action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

5, PRINCES STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

TO ENGINEERS & MANAGERS.

ESTABLISHED OVER 50 YEARS.

This is to certify that I, SAMUEL NELSON, am the only ORIGINAL MAKER of the SOLID LEAD SATURATOR, or the CASED SATURATOR.

All Estimates given free for Lead Chemical Burning, and also Contracts for Sulphate Saturators.

Note Address—

20, SPRING GARDENS, BOLTON, Lancashire.

Please write for Estimate before ordering elsewhere.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON, FITTER.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . $13\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor $94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, $1\frac{1}{2}$ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.	
Illuminating Power	16·9 Candles.	
Coke (of good quality)	67·5 per Cent.	
Sulphur	0·58	,,
Ash	2·73	,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

12, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad St., E.C.

LOW MOOR BLACK BED
GAS COAL.

YIELD OF GAS PER TON - 10,375 CUBIC FEET.
ILLUMINATING POWER - 17·50 SPERM CANDLES.
COKE - - - - - - - - 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to
GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

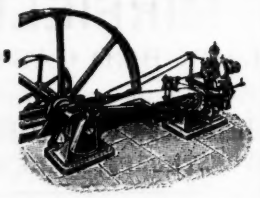
HEBBURN MAIN GAS COALS.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.
For prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.
For Prices and Particulars, apply to
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

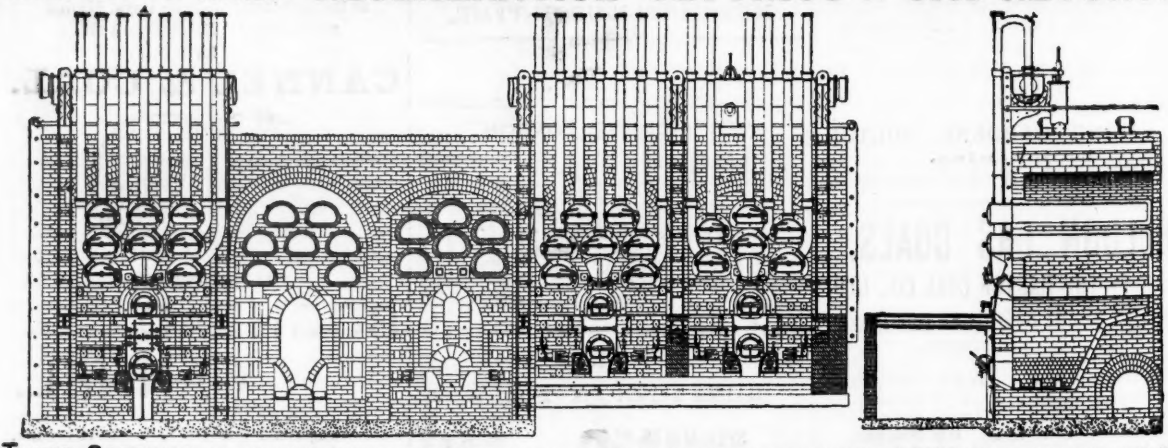
ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

JAMES MILNE & SON, LTD.,
GAS ENGINEERS,
MILTON HOUSE WORKS, EDINBURGH.
LONDON. — GLASGOW. — LEEDS.



HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.
The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.
Under G. R. HISLOP'S Patents all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
Further Information and Pamphlets from Principal Agent.

GASEOUS FIRING A SPECIALTY.

Telegraphic Address: "DRAKESON, HALIFAX."

Telephone No. 43. HALIFAX EXCHANGE.

GAS ENGINEERS. RETORT SETTERS. IRONFOUNDERS.

SOLE MAKERS OF "MITTON'S" PATENT SELF -SEALING- RETORT-LID.

JONAS DRAKE & SON

SOLE AGENTS For "HISLOP'S" PATENT REGENERATIVE FURNACES. FOR ENGLAND, WALES & ABROAD.

OVENDEN, HALIFAX.

CONTRACTORS. FURNACE BUILDERS. &c. &c.

SOLE MAKERS OF "SETTLE'S" PATENT COMBINED SEAL-REGULATING FLUSH-VALVE.

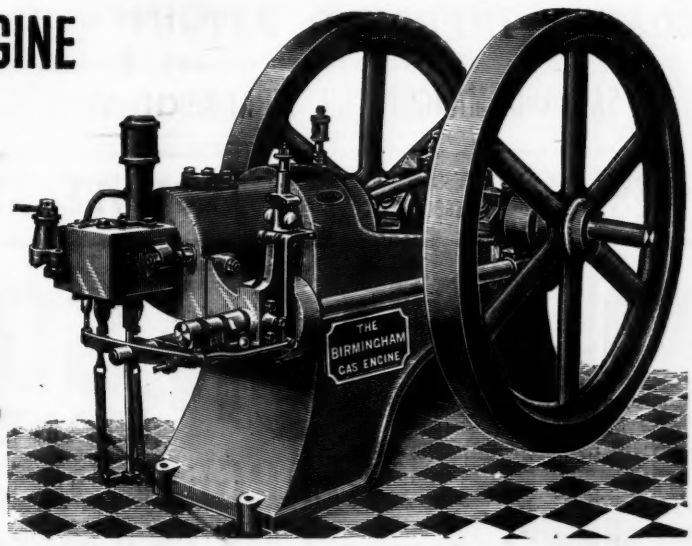
LONDON OFFICE: 60, QUEEN VICTORIA ST., E.C.

THE BIRMINGHAM GAS-ENGINE

"OTTO" CYCLE.

A thoroughly reliable Engine for Commercial or Electric Lighting Purposes. Simple, Strong, Interchangeable.

Adopted by the Corporation of Birmingham Gas Department for Driving the Conveyors at their Swan Village Works.



WILLIAM GRICE & SONS,

Engineers and Founders,

FAZELEY STREET, BIRMINGHAM.

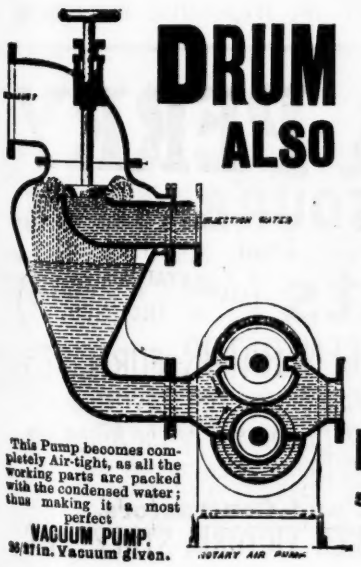
LONDON REPRESENTATIVE: Mr. SAM PUPLETT, M.I.M.E., 47, Albany Buildings, Victoria Street, Westminster.

"The Force of the Piston Pump with the Capacity of the Centrifugal combined."

JOHNSON'S PATENT

DRUM PUMP AND EXHAUSTER

ALSO VACUUM PUMP AND CONDENSER.



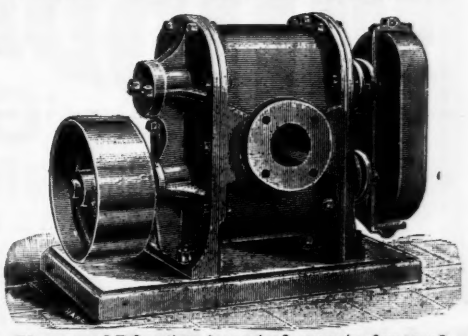
This Pump becomes completely Air-tight, as all the working parts are packed with the condensed water; thus making it a most perfect VACUUM PUMP. 30/31in. Vacuum given.

No Priming, Valves, or Frictional Working Parts.

The Pump of the future for quickly and economically moving large Bodies of Water, Semi-fluid, &c.

DRUM ENGINEERING Co.

55, ATHOL ROAD, BRADFORD.



Blowers and Exhausters guaranteed, even at a slow speed, to give a working pressure of 3 lbs. and upwards, and this without losing power by creating frictional Heat.

THE WHESSOE FOUNDRY CO., LTD., DARLINGTON.

Established 1790.

MANUFACTURERS OF EVERY DESCRIPTION OF GAS PLANT,

FROM

RETORTS

TO

GASHOLDERS

FOR WHICH THEY HAVE THE NEWEST AND MOST MODERN MACHINERY.

GASHOLDERS CAN BE MADE OF ANY DIAMETER AND PUT TOGETHER AT THE WORKS.

Holders having a capacity of **8,000,000** Cubic Feet have been made and erected; the largest one being 181 feet diameter by 136 feet 9 inches deep. Riveted entirely with $\frac{3}{8}$-inch diameter Hot Rivets.

WE ERECT GASHOLDERS EITHER WITH OR WITHOUT FRAMING.

NO ROYALTIES TO PAY FOR PATENTS.

SOLE MAKERS OF

COATES' IMPROVED PATENT FURNACE DOOR PROTECTOR,

Which has been approved and adopted by the Gas Authorities at

SALFORD, MANCHESTER, BIRKENHEAD, STOCKTON, NEWCASTLE, DARLINGTON, &c.

Telegraphic Addresses: "WHESSOE, DARLINGTON." "WHESSOE, LONDON." | T. COATES, MANAGING DIRECTOR. | WORKS: DARLINGTON. LONDON OFFICE: 28, QUEEN STREET, E.C.

CLAYTON SON & Co., LTD.,

MAKERS OF LEEDS'

LARGEST GASHOLDER IN THE WORLD

ALSO THE LARGEST METAL TANK

See Advertisement last week, also next week

MAKERS OF RETORT-LIDS OF ALL FORMS & SHAPES BY SPECIAL HYDRAULIC MACHINERY

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

London Agents:

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 „	Liverpool	2,500,000 „
Glasgow	300,000 „	Tottenham	600,000 „
Santiago	400,000 „	Brighton	1,250,000 „
Swansea	700,000 „	Bath	1,000,000 „

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Preston	1,500,000 „	New York	1,000,000 „
Southport	750,000 „	Newburgh, N.Y.	350,000 „
Tottenham (Second Contract)	750,000 „	St. Joseph, Mo.	750,000 „

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W. Telegrams: "EPISTOLARY, LONDON." *United States Office, 64, Broadway, New York.*

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."

THE "CHARLES HUNT" WASHER

HAS BEEN ADOPTED AT THE FOLLOWING WORKS—

RUGBY, STROUD, RUGELEY, SPONDON, ABERTILLERY, EAST GRINSTEAD.

IT IS SIMPLE, CONVENIENT, AND EFFICIENT.

The MANAGER of the RUGBY GAS-WORKS writes—

"I have pleasure in stating that the Apparatus has given me the greatest satisfaction, and continues to do the work required of it most admirably. Since its erection, it has effectually stopped the slightest trace of tar from passing beyond the lower chambers (although our condensers are inefficient), and has completely purified the gas from Ammonia, so far as the litmus test reveals it."

The MANAGER of the STROUD GAS-WORKS writes—

"The Washer-Scrubber erected by you here is doing its work admirably, and every day proves its value. I like it immensely; and it exceeds my expectations, for there are no traces of Ammonia in the gas after it has passed through, and it is furthermore unquestionably an excellent tar-extractor. I may add that the fact of there being no machinery to get out of order or require attention is a great advantage."

Full Particulars on Application to the Sole Makers—

MESSRS. S. CUTLER & SONS, MILLWALL, LONDON.

Price 21s., Post Free,

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PRIVATE BILL LEGISLATION
AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.
Compiled by E. H. STEVENSON & E. K. BURSTAL.

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BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

W. E. SANDER,
COMMISSION AGENT, BERLIN, 41, FRIEDRICH STR.

SPECIALITIES: Incandescent Lamp Burners and Mantles (with or without electric lighting from any distance, by button from the wall, etc.).

INCANDESCENT SPIRIT LAMPS.
Electro-technical Ware of all kinds.
IMPORT and EXPORT.

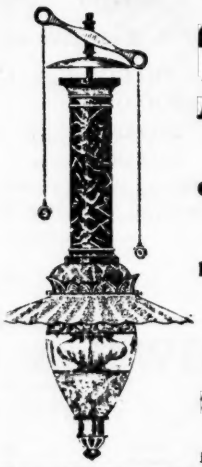
OXIDE OF IRON.
NATURAL BOG ORE FROM OWN MINES.
Samples and Prices on application.
Wm. H. MÜLLER & CO.,
81, PALMERSTON BUILDINGS, LONDON, E.C.
TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

STOURBRIDGE
RETORTS AND FIRE-BRICKS.
BEST QUALITY.
KING BROTHERS, STOURBRIDGE.
[See Illustrated Advertisement, Feb. 4, p. 248.]

PETTIGREW'S PATENT
Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
Write for Particulars, Testimonials, and References to
GEO. PETTIGREW & Co.,
GAS AND CHEMICAL ENGINEERS,
MIDDLESBROUGH-ON-TEES.

THE THAMES BANK IRON CO.
UPPER GROUND STREET, LONDON, S.E.,
SUPPLY FROM STOCK
CAST-IRON RETORTS.
AND ALL KINDS OF GAS-WORKS APPARATUS.
SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.
Sole Manufacturers of LYON'S 'PATENT' GAS MAIN SYPHONS.
AGENTS FOR
ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

The Climax of Regenerative Gas Lighting!!



THE
"VERTMARCHE"
A 280-CANDLE POWER
PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.
HENRY GREENE & SONS,
153 & 155, CANNON STREET,
LONDON BRIDGE, E.C.
PARTICULARS AND PRICES FREE. AGENTS WANTED.

J. & W. HORTON
ETNA WORKS,
SMETHWICK,
NEAR BIRMINGHAM
(Established 50 Years),
PATENTEES
AND
MANUFACTURERS
OF
and Manufacturers of every description of
Gas Apparatus,
Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.
IMPROVED GASHOLDERS AND BOILERS
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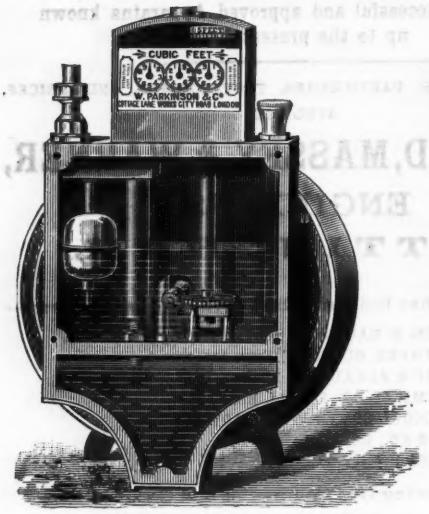

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[See also Advt. p. 288.

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